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LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

Vol. CLII. No. 3002.] LONDON, NOVEMBER 24, 1920. [72nd Year. Price 8d.

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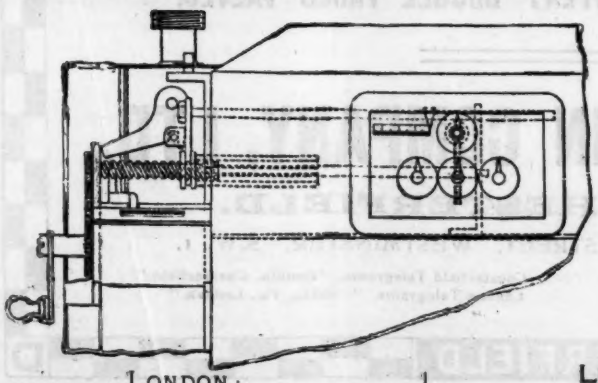

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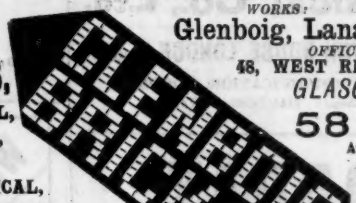

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EDITORIAL NOTES.

British Gas Industries and their Employees.

THE changed conditions of industry supply a theme which has a very present and deep interest extending beyond the borders of those who are directly engaged in manufacture and trade; for the customers of industry learnt more during the reign of high prices and of strike epidemics than they ever realized before as to how much they are personally and financially concerned in the economic conditions of industry. Many reams of paper have been covered with the expressions of men's views regarding the changes, their effects, and what in their opinion should be done to moderate the intensity of the effects. The attempt to moderate can take two courses—one is to get down to root causes, and operate there, and the other is to accept the causes as unalterable or largely so, and to work to attempt to minimize them by producing economies and higher efficiencies. Certain manufacturing industries can work along both courses; others in the main work only along the second course. The gas industry, for example, comes into the latter category; for it works on supplies drawn from other industries, and the prices it has to pay determine in major part (supplemented, of course, by its own expenditure for labour) what it has to charge for its primary commodity—its secondary products being more or less subject to market conditions. This well shows that the gas industry is very materially concerned in the changed conditions of industry external to that of gas making and supply; for those changed conditions press it severely as a buyer at all points.

This being so, there is very good reason why the men of the industry should be interested in such papers as the one that Mr. Cyril G. Davis, the new Chairman of the Council of the Society of British Gas Industries, read at a meeting of members last Thursday, as well as in the informative discussion which followed it. We all know Mr. Davis; we know his buoyant spirit and transparent optimism. We see him in this paper dealing with the changed conditions in industry in a mood and with a gravity and philosophic thoughtfulness which illustrate the danger of judging a man only by those characteristics that are most open to view. Yet in his paper we see the buoyancy and the optimism, and a far-reaching belief in humanity, and in the capability of compounding for good all engaged in industry—from highest to lowest—with all moved by the single desire to attain the utmost degree of progress, just as the components of a machine are all necessary to its efficient working. There is much road to be traversed before this is accomplished. It is a big task. But the choice is between undertaking the task and allowing conditions to remain chaotic, and the human elements in industry in continuing strife. The task had better be undertaken. The neatly constructed presentment of the case as to the changed conditions in industry that we have in this paper by Mr. Davis carries us to that conclusion; but it stops short at telling us how best to accomplish that which is recognized as desirable.

We need no comparison as to the industrial conditions existing before the war with those that prevail now, to emphasize the great transition there has been. The conditions, antecedent to and succeeding the war, are so well known to us all that there is no hesitation in accepting the fact of the existence of the changes. They are present everywhere. Their dimensions are known within the sphere of the operations of each manufacturer. To an extent, he is powerless; he cannot do more than exercise his cerebral powers and energies to do the utmost to reduce effects. It is our deliberate opinion that the old economic laws that came into play in the ordering of things, while not destroyed, will now have to move along new pathways. For example, the law of supply and demand will (as things are) have little effect by itself in the final settling of wages and hours, with the trade unions and the members of the unions insisting on the maintenance of much higher standards of pay and of leisure, and applying rules to output that wholly defy the economic canons. In this ruinous line of policy, the trade unions have been encouraged by the ease with which the circumstances of the past few years, combined with Government control, have enabled them to enforce higher pay and a reduction of hours. And now that the highway provided by the cost of living threatens to break down, they are branching-off to a higher standard of living. The extremists have had their opportunity; and they have used it unscrupulously, and, from their point of view, with very good effect. They are naturally unwilling to lose the ground they have gained. But, as Mr. Davis points out in his paper, the time will come when the economic conditions in regard to competitive international trading will demand some recession in the cost of labour, or alternatively the equivalent will have to be given in higher production. Manufacturers have to look these facts squarely in the face in these times when costs have risen to such a height, and there is an ebb in trade, through a buying incapacity abroad and at home in the prevailing financial situation. Economic laws are not rendering at the moment any help in reducing wages, in increasing hours of work, or in augmenting production. This fact is patent. The only reduction in pay that is being made is through the lessening of the hours of employment owing to the slump in the demand for materials and goods. Should an effort be made to reduce the current rates of pay, then, in present circumstances, there will be as big a fight against such a movement as there was for the gains that have been achieved. Mr. Davis has greater confidence than we have as to the part that economic forces alone will play in this matter of bringing about a better relation between work and production on the one hand and pay and hours on the other. He says that, though abnormal conditions may, for the time being, obscure the play of economic forces, these forces are ever steadily operating, and must eventually restore the balance as between the worker and the community as a whole.

There is no doubt economic forces will play some part in this direction; they may—we earnestly hope they will—help to open the eyes of the organized workers to see things in a new and truer light, and to show them the fallacies of the new school of trade union thought which have led such a large proportion of the members astray. If the economic forces will accomplish that much, the outlook will be more hopeful. Economic forces, however, will not alone prove efficacious. And this is where Mr. Davis falls short of completing his examination of the situation and prospects. His examination has caused him to conclude that the relations of capital and labour (a term which Sir Arthur Duckham wishes people would discard once and for all, and treat capital and labour as components necessary to each other in the industrial system) do not now differ materially from what they were before the war; and he does not see the need of pessimism respecting the future, notwithstanding the action of labour extremists. We should be pessimistic if the remedial means were only confined to economic forces. Something more active and potent is necessary in dealing with abnormal and strongly entrenched conditions. Mr. Davis gets in touch with that which is necessary; and then leaves it. He believes that the union of interests between employers and employed would lead to great strides in industry. But he did not pursue this line of thought, to show how the union of interests is to be effected. Those who

took part in the discussion supplied the omission; and there must at once be congratulation to our manufacturers upon the spirit in which they are attacking the problem and the situation. Employees are not devoid of intellect and reason; and the best antidote to the pernicious doctrines that are being promulgated to-day is the application of new methods inside the works themselves—methods which will give the employees the feeling of participation and create interest, by taking them into confidence, and by giving to them an insight into the actual conditions of the business in which they are engaged. There must not be too much limitation; and there must be frankness. The manufacturer himself has got to set to work in this matter, and not allow things to drift to disaster. Instituting works committees is the favoured addition to industrial organization—works committees elected by the men themselves. Testimony as to value came thick and fast at the meeting of the Society of British Gas Industries. Manufacturers of gas plant and appliances are to the fore in this regard. We will not comment on what was said. But readers will learn much by reading the speech of Sir Robert Hadfield at the luncheon, and what was said in the discussion, particularly by Alderman Fred West, Mr. Harold Davis, Mr. F. G. Cockey, and Mr. Thomas Glover. Mr. West has monthly meetings with the men's representatives, and reports to them information as to the contracts the firm have secured and have in progress. They now know more about the business than ever before; they know more of the difficulties and anxieties of their employers; they begin to get intimate with what are called economic conditions; and they will get to learn more and more what they themselves must do, and what they must not do, if they wish to help to maintain the business which gives them employment. There were notable things said, too, by Sir Arthur Duckham and Mr. Cockey, which show that confidence begets reasonableness, and that the men have power, and will exercise that power, when satisfied that the need exists for their doing their part in easing the difficulties and burdens of management. Commonsense relationships are better than the old partitions, to which are due much of the turmoil and discontent from which industry is now suffering in a very material degree. Whoever is to blame, there should be no further delay in making the only change that can be effective against the developments (promoted by extremists) which are too well known to need any specific description; and this "only change" is closer relationships.

Difficulties and Misunderstandings through the Want of a Complete Alliance.

NEVER was there a time when it was more desirable that the principals and technical men of the industries providing the gas industry with gas-making plant and gas-using appliances should be an integral part in the representative corporate bodies of our industry. That they are not is, in our opinion, having a detrimental effect upon the interests of the industry—both indirectly and directly. Indirectly because the closer association of the technical men on both sides of the industry would bring about a better acquaintance with what is required in this period of a great transition; and directly because the artificial division that has been set up continues to cause resentment which is not good for the industry at large. We know that this is so. It is not our opinion only—it is that of a considerable number of responsible men in the gas industry—when we say that the continued division is a grave mistake, which could be easily remedied. There are various questions on the board at the present time—questions referring to the design of plant and gas-using appliances, in which there should be the closest co-operation between the Institution of Gas Engineers and the firms engaged upon the different branches of work. There are matters referring to contract terms and prices of goods and to standardization, in which the National Gas Council are concerned. These and other subjects (as will be seen by the report of the Council of the Society of British Gas Industries as printed in this issue) call for, in the present separate states, conferences through Joint Committees, and a good deal of circuitous work.

There is, too, a great deal of misconception and misjudgment abroad, and unauthenticated insinuation is flying about, which could largely be avoided if there were closer co-operation within the same bodies, which would result in better knowledge. It is always easier, quicker, and more satisfactory in such matters as these to deal with people within one's own doors than with people who are outside. The times have changed, and so have the conditions under which work is carried on by manufacturers and contractors. There may be items in the standard contract clauses which now require amendment; there is no doubt a very substantial necessity for manufacturers and contractors to protect themselves against unforeseen contingencies. They are not endowed with more prescience than are the administrators of gas undertakings; nor can they govern their markets any more than can the latter. The information we have had as to costs, supplemented by an independent following of the course of the markets for materials, does not convince us that they are doing anything more than is legitimate, and so justified. Attacks on integrity (though only suggestive) should have something more substantial behind them than pure hypothesis. Though a shallow method of attack, it cannot but tend to injure reputation in some unthinking quarters. But as we say, all these are matters upon which greater satisfaction could be realized if the organization of the industry was rounded-off as it should be. We believe Sir Arthur Duckham was speaking with the fullest sincerity when he said, at the meeting of the Society of British Gas Industries last week, that the prosperity of the gas industry was the prosperity of the contractors and manufacturers; and in what the latter did they were governed as much by advantage to the gas industry as by advantage to themselves. It is galling to men who are doing their best in the most difficult circumstances to have their sincerity challenged. Sir Arthur, as a gas engineer and contractor, knows fully what he is talking about; and when he asserts that the members of the Society meet not for the purpose of "doing down" their clients, but for the good of the industry, there is a spacious meaning attaching to the words, which were unquestionably intended for a larger audience than he had before him at the time of their utterance.

In another part of the proceedings, Sir Arthur urged that the Council should seek to take steps to secure closer association with the National Gas Council, as well as with the Institution of Gas Engineers. But he does not advocate that the Society should go cap in hand. There is no need for that. Qualification and position justify equality. The report of the Council is also testimony to the fact that there is much work to be done to-day in which the two parts of the industry are indispensable the one to the other. Sir Dugald Clerk expressed his satisfaction over the paper presented by the Society at the last meeting of the Institution; but work of this character is only a step—a step which falls short of what it is obviously desirable to attain—the maximum good by the complete unity of talents and of resources.

Development of Internal Resources.

THE Government appear to be duly impressed with the fact—this being one of the great lessons of the war—that one of its functions is to make this country as self-supporting as its internal resources will permit. Such an ideal never prior to the war seemed to have found entrance into the then tradition-stuffed heads of our politicians. They were comfortably content to tread the well-worn paths that had done duty for ages. But war now is a different matter from what it was before 1914 taught our legislators that invention had outstripped their notions of protection, and that shrapnel-filled shells are no match against high explosive shells, and mercantile ships no match against submarines. Had these things been appreciated, the gas industry and the dye industry would have been encouraged to develop to the full girth of their opportunities—the gas industry in order that the materials for high explosives would have been at once available, as well as greater supplies of sulphate of ammonia for intensified food production and explosives output; and the dye industry because its more extensive plant would have been exceedingly valuable towards the development of explosive compounds. Nothing was done by Government to encourage the development of the gas industry. Oppression rather than encouragement was its lot; and yet the carbonization of coal was as important to the winning of the war as Woolwich Arsenal and the other great munitions places then already established, and the others that were hastily brought into being. The primary product of the gas industry was also wanted in huge volumes for the heat treatment of munitions. We hear of "key" industries. If there is an industry that should stand at the top of the "key" industries, it is that of gas supply. The fact that the Government are now anxious to develop the country to meet all the needs in the gravest of emergencies, is

apparent. At the moment they are dealing in a Bill with agriculture; and they propose compulsory improvement, as, should another war unfortunately come, it would be the height of insanity not to be prepared for it in relation to food supply. To bring about improvement in agriculture, artificial fertilizers are required, and sulphate of ammonia prominent among them. The Bill, the Premier says, is essential to the strength and safety of the country. There are other industries that are essential to the "strength and "safety" of the country; but to get them to recognize this the Government want their memories jogged from time to time. The gas industry is a prominent essential, and a reserve force big with national importance.

Rates Increases and Gas Undertakings.

IT is quite time that the supreme governing authority became alarmed at the upward flight of local rates and the rising public indignation over the matter, though public opinion must not go astray and put the increase all down to riotous living or extravagance on the part of local administrations. A large proportion of it local authorities cannot help—in fact, Dr. Addison, in the House of Commons last week, put at 90 p.ct. the part of the increase in rates due to the rise in the costs of materials and wages. Of course, one must know what the materials and wages are for before one can say whether or not the 90 p.ct. of the increase for such payments is altogether warranted. It is very unsafe, too, to deal in averages when considering such a matter as this, inasmuch as they are blinds—vexatious to those local authorities who are trying to retrench, and gratifying to those who are indulging the inclination for a welter in prodigality. In some localities, the amount of rates in the pound have made a fearful flight; in some others the increase is quite moderate. However, generally speaking, the rates are now very heavy; and it is time that Parliament looked into the question to see whether they can do anything to get local authorities to cut-out all extravagance from their operations, and to ease-off as far as possible in those matters that can conveniently and without harm be put aside during the present financial stress.

The subject had prominence given to it in the House during the discussion last week on the Ministry of Health Bill, which members considered would give undue rope to local authorities in respect of expenditure; and Dr. Addison, knowing the poignant feeling that existed, was prepared, with the consent of the Government, to drop thirteen of the clauses, while retaining those dealing with housing and hospitals. No one wants to hamper the provision of houses and hospitals; they are essentials. But this is not the time for purely non-essentials. It is quite true the House of Commons cannot effect any complete control over local expenditure. The best protection can come from the ratepayers themselves—by paying more heed than they usually do to the call of the ballot-boxes at the time of the municipal elections. But the House of Commons can do a good deal in declining to sanction unnecessary expenditure, and by bringing its influence to bear against lavish schemes. Beyond this the Government appear to be quite at sea as to their potentialities in the matter. Therefore they are going to set-up a Select Committee to inquire and to ascertain in what way (if any) Parliament could effectively exercise "some" control over expenditure by local authorities in relation to Bills introduced into the House of Commons. Had this investigation not been so late, it might have been suggested that, in connection with the housing schemes, one fairly considerable saving might have been effected by refusing to allow expenditure in laying cables and fitting-up houses for the single purpose of electric lighting when mains had to be laid and houses piped for providing gas for cooking and other heating purposes. This is only one item in that accumulation of economies which could be effected by a little more deliberate consideration and decision on the part of our municipal authorities. The Select Committee should have an interesting amount of information laid before them; and perhaps they will have time to pay some attention to that pernicious form of municipal management which conducts electricity undertakings at uncommercial prices, and then inflicts upon the ratepayers (among them gas undertakings) a burden of deficit. There is, too, that objectionable policy of indirect taxation which imposes on the patrons of local authority trading undertakings higher prices than need be charged, in order to provide excess profits from which to take a contribution towards the rates. Trading undertakings run by local authorities should render their services at the lowest possible price consistent with sound finance. They should be run on ordinary commercial lines, and take nothing from the rates, nor contribute anything to them. If, unfortunately, they require temporary aid from the rates, then it should be repaid; and there should be no permanent indebtedness whatever to the ratepayers as a body.

Gas undertakings are located with railway companies at the top of the tree as payers of rates; and, as a rule, the undertakings are assessed to the utmost penny. We have not the figures by us of the sums paid as rates as distinct from taxes; but "Field's Analysis" shows that the combined figures have gone up considerably. In the case of the three Metropolitan Companies, in 1919 the item of rates and taxes amounted to £591,216, compared with £473,841 in 1914—an increase of £117,375. The eight Suburban Companies showed an increase from the 1914 figure of £87,856 to £134,740 in 1919—an addition of £46,884. The eleven Provincial Corporation concerns named in the "Analysis" have a bad showing. In their case, the aggregate payments ascended from £246,502 to £442,730—an advance of £196,228. The nine Provincial Companies are not so bad. The item in their case passed from £84,697 in 1914 to £123,515 in 1919—an increase of £38,818. The worst increases per 1000 c.ft. of gas sold are: Gas Light and Coke Company, 2·96d. in 1914, and 3·51d. in 1919; Nottingham, 2·53d. in 1914, and 5·97 in 1919; Bolton, 2·08d. in 1914, and 4·6d. in 1919; Manchester, 2·68d. in 1914, and 4·49d. in 1919; Salford, 2·66d. in 1914, and 4·22d. in 1919. The gas industry is thus very interested in seeing that everything possible is done to keep the rates as low as possible, or as low as is justified by efficiency in local government. At the same time, it realizes from its own acute experiences that part at any rate of the advance is unavoidable.

Notices for Orders.

The notices of applications for Orders under section 1 of the Gas Regulation Act continue to come forward with good vigour. Among those dealt with in other columns this week is that of the South Suburban Gas Company. It will be remembered that the Directors very properly withdrew from the Company's Bill last session the clauses dealing with the heat-unit basis of charging, after the decision of the Lords Committee, which would have been totally unfair to the existing stockholders. The Directors preferred to take the alternative course of putting their application before the Board of Trade under the Gas Regulation Act. This they are now doing. The Cardiff Gas Company are asking for 1s. 7d. per therm in the city; but for outlaying places, the price per therm is worked out to the third place of decimals! The Plymouth and Stonehouse Company, it will be observed, have adopted the simpler plan of 0·2d. movements—the figures being in respect of Plymouth and Stonehouse 14·6d. per therm, and in respect of the outlying parishes 17·2d. per therm.

Heating Retort-Settings.

The heating of retort-settings is a subject that supplies a large area for investigation, and for improvement. The Presidential Address that Mr. G. Dougill, of Heckmondwike, delivered to the Yorkshire Junior Gas Association, brings the question to the front; and it contains some very practical suggestions which require to be considered in future designs. When it is remembered that of the heat supplied to a retort-setting, 60 p.ct. and more is lost in the operation, and less than 40 p.ct. is usefully employed—and this in well-supervised settings—there is reason for considering how much the loss can be diminished by modification in the structure itself. Mr. Dougill leans to the vertical retort as exemplifying the most efficient heating; for with equal temperature flow through the retorts, the combustion chamber temperature is approximately some 150° C. lower. He lays to the charge of the horizontal retort supporting walls a good proportion of the difference; and it is interesting to read in the discussion how at Leeds they are proposing in some retort reconstruction work to put in thinner supporting walls with equal spacing, so that the walls will be at more frequent intervals. In this way it is hoped to get better heating, and still retain mechanical strength. Mr. Dougill also prefers large combustion chambers, as, in his view, small combustion chambers cause rapid wear, compared with the distributed heat in the larger chambers. He refers to several other

factors which govern heat flow and affect the question of efficient heating. He suggests that in horizontal retort plants, where outside producers are installed, it seems a feasible proposition to follow coke-oven practice—that is to say, build the retorts in vertical lines, and the combustion chambers at each side of the retort, with recuperators and the change-over. The address and discussion are printed in this issue, so that readers can for themselves pause and consider the full argument.

Exported Gas Coke.

During October, the quantity of gas coke exported was down to 43,808 tons; and of other sorts 27,724 tons—together 71,532 tons. In the corresponding month of 1919, the total exported was 145,492 tons. The value of the 43,808 tons of gas coke was £311,257; and of the 27,724 tons of other sorts £215,764. The value of the gas coke works out to £7 2s. 1d. per ton. The total quantity of gas coke exported during the ten months ending October was 676,034 tons—the aggregate value being £4,171,191. The quantity of other sorts shipped in the same period was 833,853 tons; the value being £4,668,974.

Licences for Exporting Coke.

Some gas undertakings are accumulating quite considerable stocks of coke which they cannot dispose of locally; and so the fuel is simply deteriorating in store. This is a pity. With the removal or modification of the restrictions on export licences, and a little more generous consideration by the local Coal and Coke Supplies Committees (about the arbitrary actions of some of whom there is a good deal of complaint), the position would be relieved, and more business would accrue to the industry and to the country, and advantage to gas consumers. The National Gas Council have the matter in hand with the Mines Department, who are being pressed to review the position, and to relax the conditions affecting licences.

Transport Unions.

There is a large scheme afloat for the amalgamation of nineteen unions covering all sections of transport workers from dock labourers to vehicle workers, and a large body of general workers. When the coal trouble was on, the Transport Workers' Federation found themselves at a disadvantage, compared with the other two members of the Triple Alliance, in so far as reaching decisions was concerned, in view of the fact that the various Unions within the Federation had refused to hand over to that body their strike-calling powers.

The Coal Settlement.

The representatives of the coal owners and miners to whom has been entrusted the big task of formulating regulations for the future conduct of the coal mining industry, met last week; and, in the first place, they constituted themselves a National Committee under the terms of the recent settlement. Another resolution dealt with the output of coal. In all areas where district committees do not now exist, they are to be established forthwith; their duty being to take into consideration the best method of securing an increased output of coal, and for this purpose to obtain the hearty co-operation of those engaged in the collieries. There will be a close scrutiny of returns of output, to see how far success is progressively realized. As to the future regulation of wages, a preliminary discussion took place on the scheme to be submitted to the Government.

Therm Prices at Different Calorific Powers.

The heat-unit basis of charging will create a demand for a set of handy tables. Messrs. Clark & Stainer, of 147, Manor Grove, Richmond, Surrey, are among the compilers and publishers of a set which shows at a glance therm prices at different stages in calorific values between 400 and 600 B.Th.U., based on prices running from 4s. to 10s. per 1000 c.ft., and at every penny advance between these figures. The range of calorific values passes from 400 to 500 in stages of 5; and from 500 to 600 in stages of 10, with the exception of 525. This will no doubt meet all present requirements, and will give satisfaction to all save those enthusiasts who are looking to the time when town gas will be, in their view, distributed at calorific values below 400 B.Th.U. We have checked the calculations taken at random from the half-dozen sheets of tables, and, within the limits of the checking, have not found a single error—not that we expected to find one in a piece of work of this character. This set of useful tables are supplied for 15s., post free.

THE NATIONAL GAS COUNCIL.

Central Executive Board Meeting.

A MEETING of the Central Executive Board of the National Gas Council was held on Tuesday of last week, at No. 30, Grosvenor Gardens, S.W., when the following matters were considered and discussed:

GAS REGULATION ACT.

A list of the undertakings selected by the various districts to make prior application under the Act was submitted.

COAL.

The withdrawal of the "Emergency Orders" by public notice in the Press on the 4th inst. was referred to. The steps which the Council were taking with a view to dealing with the question of short weight were reported.

COKE.

Although coke is now released for export, subject to the stipulation that four weeks' production for sale is held in stock, and that local demands are first satisfied, complaint was made of the arbitrary action of the local Coal and Coke Supplies Committees in unduly withholding their recommendation for a licence to export. An instance was given of a gas company being granted a recommendation for a provisional permit to export a certain quantity of coke, on the condition that the same company sent an equal quantity of coke to a neighbouring area at a price fixed by the Coal Supplies Committee, which happened to be considerably lower than the prices ruling in the district to which it was to be sent.

It was stated that the National Gas Council were pressing the Mines Department to review the whole question of export licences for coke. The restrictions placed upon gas undertakings were becoming a serious menace, as undertakings had large stocks which could not be dealt with by the home trade, and were consequently in store and deteriorating.

RAILWAY RATES.

It was reported that the interests of the gas industry were being represented by the Council at the general inquiry before the Railway Rates Advisory Committee, who were at the present moment considering the general principles which should underlie the rates to be charged by Railway Companies in the future.

UNEMPLOYMENT INSURANCE ACT, 1920.

A summary of the Act was given, and it was agreed that it would be advisable for gas undertakings to insure their employees, rather than apply for exemption under the Act.

SPENT OXIDE.

A joint meeting with the National Sulphuric Acid Association on Oct. 13 was reported, when it was contended, on behalf of the gas industry, that the price of sulphuric acid was too high in comparison with the price paid by acid makers to gas undertakings per unit of sulphur in spent oxide.

The Sulphuric Acid Association suggested at the meeting that a deputation of three representatives should be appointed to meet members of the Spent Oxide Committee, in order to go into the figures.

Mr. Thomas Glover (Norwich), the Chairman of the Spent Oxide Committee appointed by the Council, gave an account of the meeting of that Committee held on the previous day, and stated that further figures were being obtained.

CONTRACT PRICES.

The desirability of the publication, month by month, of the prices obtaining for labour and material was again raised. A resolution was passed to the effect that the Council consider that steps should be taken to bring to an end as soon as possible the system of variable contracts, and that the question be referred to the Joint Committee of the Council with the Society of British Gas Industries, with the request that some agreed method of arriving at costs from time to time should be adopted until the system of firm contracts is re-established.

INCOME-TAX.

It was reported that the Council had ascertained that, where it is proved the circumstances justify it, the Surveyor of Taxes may, at his discretion, agree to continue the 50 p.ct. increase allowed during the last three years in respect of depreciation of gasholders, meters, and cookers.

LIFE OF GAS-METERS JOINT COMMITTEE.

Gas undertakings were recommended to have inserted in their Private Acts a clause protecting them from the consequences of overdriving and incorrect registration of meters fixed by outside fitters, as also from the danger of high-pressure air-blast connections.

BENZOLE.

Mr. Thomas Glover (Norwich) reported upon the investigations he had carried out on the costs of washing gas for benzole. Mr. Glover was thanked for the trouble he had taken in the matter; and it was decided to circulate these figures among members of the Board with a view to further discussion of the subject.

RADIATION, LTD.

It was reported that a statement was being circulated in the Provinces to the effect that the National Gas Council had accepted

the system of stove standardization recently announced by Radiation, Ltd., and in consequence were abandoning their own proposals for standardization. It was stated, on behalf of the Council, that this report was entirely unfounded—in fact, the Sub-Committee, appointed by the Standardization Committee of the Council to make investigations and to report upon standard cookers suitable for the various districts, had held a meeting the previous day in London.

NATIONAL GAS COUNCIL DISTRICT BOARDS.

Scotland.

The Second Annual Report of the Management Committee of the District Executive Board for Scotland of the National Gas Council states that the number of gas undertakings in Scotland joined to membership of the National Gas Council is 80, representing 31 p.ct. of the gas-works and 90·8 p.ct. of the make. Among the questions that have been dealt with during the year are the following:

Standardization of Gas Cookers and Meters.—As desired by the Central Executive Board, considerable information relating to cookers at present in use was obtained, and forwarded to the General Secretary. The Committee approved of the proposed standard sizes of gas-meters, with the suggestion that the 3-light size should be retained as being more particularly required for Scotland; and this suggestion was ultimately accepted.

Scheme for the Disposal of Tar and Ammoniacal Liquor to Distillers.—The scheme has continued to work satisfactorily; and it is now recognized that the sale of these bye-products on a sliding-scale, as determined by an arbiter on the basis of monthly market values, is fair and equitable as between parties. With a rising market, the values of tar particularly have risen considerably; and gas-works have thereby benefited financially to a greater extent than would have been possible under contract. The following are the monthly prices:

		s.	d.		
November,	1919	26	3½	per 100 gallons	
December	,,	27	0½	,,	,,
January,	1920	29	7½	,,	,,
February	,,	34	4	,,	,,
March	,,	39	0½	,,	,,
April	,,	43	3½	,,	,,
May	,,	47	10	,,	,,
June	,,	52	1	,,	,,
July	,,	57	9½	,,	,,
August	,,	62	0½	,,	,,
September	,,	65	2½	,,	,,
October	,,	68	3½	,,	,,

The number of gas-works which have accepted the scheme is 117, compared with 40 a year ago. Mr. Thomas Henderson, of Glasgow, is the arbiter, at an annual fee of 100 guineas, paid equally by distillers and gas undertakings. The contribution payable by each gas-works is from 10s. 6d. to £2 2s. per annum, according to the scale based on output of gas.

Municipal Gas Undertakings and Municipal Electricity Departments—Financial Deficits of Latter Met from Profits of Former.—This subject has been very fully discussed with the officials of the National Gas Council, and also at an interview with Mr. Moody, of the Scottish Office. As the subject is one peculiar to Scotland only, evidence has further been laid before Sir Henry Keith, who is in sympathy with the need for a change of legislation, and has agreed to bring the matter before the Convention of Royal Burghs. This procedure has been agreed to.

Valuation of Gas-Works.—Considerable delay has arisen in having this matter sufficiently dealt with, owing to the apparent difficulty in having a meeting between parties. The Association of Local Lands Valuation Assessors of Scotland have appointed a Special Sub-Committee to meet with representatives of gas undertakings; and it is now understood that an early meeting is expected.

Gas Regulation Act.—Acting on instructions received from the Central Executive Board to forward selected cases of applications to the Board of Trade, the cases of the Coatbridge Gas Company and the Stirling Gas Light Company have been placed first in the order of application from Scotland.

The Chairman of the Committee is Mr. A. S. Legat (Coatbridge); the Vice-Chairman, Bailie Stewart (Edinburgh); and the Secretary, Mr. J. W. Napier (Alloa). The representatives on the Central Executive Board are Messrs. A. S. Legat, J. W. Napier, Laurence Hislop, and Bailie Stewart.

Ireland.

The Second Annual Meeting of the District Executive Board for Ireland was held on the 11th inst. at the offices in D'Olier Street, Dublin, of the Alliance and Dublin Consumers' Gas Company—Mr. W. J. Grey in the chair.

The annual report was adopted, and the Management Committee appointed. Mr. W. J. Grey was appointed Chairman of the Board, Mr. P. J. Fitzpatrick Vice-Chairman; while Mr. George Airth was re-appointed Hon. Secretary. The following were nominated members of the Central Executive Board: Messrs. G. W. Anderson, W. J. Grey, R. B. Anderson, and J. D. Smith.

ELECTRICITY SUPPLY MEMORANDA.

VARIOUS phases of street lighting received attention in the "Memoranda" last week, owing to the electric lighting authorities transferring their favour from the nuisances they formerly imposed upon the public in the shape of jerky flame arcs to the new gasfilled—alias the half-watt—type of incandescent lamp. Very special attention is also now being paid to the scientific application of the light rays given by these lamps; and this is highly necessary if any good is to be done with them in street illumination, in view of the concentrated nature of the light, and the short length of the rays emitted. Naturally, if the light rays in the upper hemisphere can be collected, and be directed to serviceable use at a distance from the source, one of two things will result: Economy can be achieved, or the degree of the illumination a distance from the source can be improved. This is something worth aiming for. Though we do not like to see too much darkness overhead (it is somewhat depressing), it must be conceded that, when the lamp standards are anything from 17 to 30 ft. in height, the drawback referred to as to overhead conditions loses force. Moreover, it is not above that the light is usefully employed; its mission is confined to public utility, and public utility is found on the road and pathways. Therefore, it is the business of lighting engineers to make the utmost, and that usefully, of the light emitted by the source, and utilize ingenuity and practical invention in the work.

Usefully Utilizing Light.

Economic Heights and Distances.

In his second "Street Lighting" article in the "Electrical Review," Mr. Haydn Harrison—adopting for his argument the recommendation of the Joint Committee who considered the question of standard clauses for inclusion in street-lighting specifications, as to a minimum horizontal illumination of 0·1 foot-candle in Class A streets—proceeds to offer various considerations affecting this aspect of the matter. One point is that the higher the standards up to 30 ft., the lower the candle power required at the source to secure the minimum illumination, although the figures he gives show some vagarious movements having regard to the law of inverse squares. For example, with lamps at a distance of 100 ft. apart on standards 12 ft. high, a 750-c.p. source is needed; with a standard 5 ft. higher (17 ft.), 580-c.p. is required; with a standard 7 ft. higher (24 ft.), 383-c.p.; with a standard 6 ft. higher (30 ft.), 340-c.p. would suffice. There is a big difference in the candle powers between the 17 and 24 ft. standards, and a very small one between the 24 and the 30 ft. standards. Another lesson of the figures is that there is no uniform proportion between the distance apart of the standards and the light required per source. We have given the figures for standards 100 ft. apart. At 300 ft. to get the same minimum illumination on a 12-ft. standard a 32,000-c.p. light would have to be mounted; on a 17-ft. standard, 12,450-c.p.; on a 24-ft. standard, 8380-c.p.; on a 30-ft. standard, 6620-c.p. Thus, assuming the figures to be reliable, economy claims a satisfactory height of standard, and that the space between the standards should be a reasonably moderate one. This point is emphasized in a table which follows. Mr. Harrison prefers to aim at a height of not less than 24 ft.; and then, to obtain the minimum horizontal illumination of 0·1 foot-candle, the total candle-power necessary per mile of street for different spacings is as follows:

At 120 ft.	apart	617 c.p.	or 27,000 c.p.	per mile.
180	,,	1900	,, 57,000	,,
240	,,	4360	,, 96,000	,,
300	,,	8380	,, 110,000	,,

Thus when the lamps are spaced at 300 ft., four times the candle-power is needed to equal that at 120 ft.—the actual candle-power of each lamp being 13·5 times as much, despite the fact that the area and the minimum degree of illumination are the same.

Gathering in and Redirecting the Rays.

This is where scientific application must come in. Luminous energy is distributed in all directions from light sources; and so it comes about that economy and efficiency demand that by suitable devices the light proceeding in directions where it is not usefully employed should be redirected to angles 10° or 20° below the horizontal, so that it reaches the more distant points to be illuminated between the standards. Means for directing the luminous flux to distant parts of a street or road have been devised by several people; but (according to Mr. Harrison) they have proved impracticable on account of the fact that they interfere with the lower hemispherical distribution. Mr. Harrison claims to have devised means by which only the upper hemispherical luminous energy is directed to the distant area of the street; the lower hemispherical distribution remaining unaltered. It is asserted that with this apparatus, the luminous intensity in the required direction is ten times that of the original source. Theoretically, it should be higher; but that is the average result in practice, including all losses due to the absorption by protecting lanterns, dirt, &c. A road formerly lighted with 550-watt flame arc lamps, had a minimum illumination midway between the lamps of only 0·005 foot-candle. With 300 to 350 c.p. gasfilled

lamps, and the new directive fittings, the minimum is now said to be 0·05 foot-candle, or ten times more, though the gasfilled lamps are under-run in order to obtain a higher average life. In this case the consumption of electrical energy amounts to 6 units per hour per mile, which at 4000 hours per year, and 3d. per unit, would amount to £300 a year per mile for electrical energy. Renewals, cleaning, &c., Mr. Harrison puts (awarding the lamps an average life of 800 hours) at £100. With the average life mentioned, the lamps required per annum (without accidental breakages) will be five per standard; and the standards being at 240 to 300 ft. apart will number (say) 20 per mile. We take it there are two lamps on each standard, which means 200 lamp renewals per annum. After paying for the lamps, the change out of £100 for paying labour and incidental charges will be of rather an exiguous order. The £400 will not even cover capital and other outgoings, including the maintenance of cables, columns, lanterns, and other accessories.

Short Life and Hyper-Sensitiveness.

Mr. Harrison, it will be noted, puts the life of the under-run gasfilled lamp at 800 hours. Mr. E. W. Dorey recently [*ante*, p. 194] awarded the lamp a life of 700 hours, compared with 1000 hours for metallic filament lamps. The "Illuminating Engineer" draws attention to the question of the life of gasfilled lamps of the smaller sizes, and quotes the results of some tests recorded in the "Electrotechnische Zeitschrift." In the tests, 40-watt lamps of the 110 and 120 voltage types were used. Considerable difference was found in the performance of lamps of various makes. In one batch there was an unpleasant tendency for the lamps to explode suddenly in the early part of their life, "due apparently to a change in the gaseous contents, which become ignited." This is an interesting hypothesis. We should like to know more as to what "change" proceeds which converts an inert gas into an explosive mixture. Or is pressure increase the cause? We confess to having been in a picture palace not long since, when a large gasfilled lamp exploded with a loud report, and startled the audience considerably. Fortunately the *débris* was all caught in the suspended bowl below. There ought to be a very thorough investigation into the alleged "change," which causes lamps to explode. Of the batch referred to, thirty out of one hundred gave way within 1000 hours; while in another batch only one lamp failed. In a further instance, the shattering of one lamp seemed to cause others to do the same. Over-running causes a diminution in the useful life of lamps; and tests on this point made the following disclosures: The useful life of one make of lamp ("A") at 220 volts is put at 1495 hours. At 235 volts (6·8 p.ct. increase in pressure), the useful life was reduced to 713 hours—a decline in life with this comparatively small increase in pressure, of 52·3 p.ct. At 250 volts (13·6 p.ct. increase in pressure), the life was reduced to 480 hours, or 68 p.ct. diminution. At 300 volts (36·4 p.ct. increase in pressure), the life was only 31 hours, or 98 p.ct. diminution. Another make of lamp disclosed much the same results with like increases of voltage.

Motor Hire.

It was stated at a recent meeting of the Warrington Town Council that it paid manufacturers better to hire electric-motors from the Corporation than to purchase outright on their own account. In the hiring business, it is generally the other way about. Purchase outright should offer a money inducement to manufacturers over hiring. But if the assertion is true, at Warrington the reverse applies. The same speaker stated that the life of the motors, which cost £20 to £30, was only ten to a dozen years. The hiring charges have been revised; but apparently some people think that the revision was of too meagre a description. Evidently the Electricity Supply Committee are a little reticent about offending the manufacturers, which suggests that they are not on very firm ground in this matter. The Committee say that there is an atmosphere prevailing for everything to be cheaper, and not dearer. No doubt there is; and the feeling and resentment against continued high prices are growing. People everywhere want to see the "atmosphere" develop into an actuality, but not by a mere shifting of obligation from one thing to another. Motors, of course, are dearer than they used to be. Capital charges, renewals, and maintenance are also dearer; but it is thought that top prices have been reached, and that a recession may be looked for. Meanwhile, however, if this particular hiring business is to be kept in a solvent state, then the income from rents should be at the necessary level.

Mishaps.

In the House of Lords on Monday last week, there was a fusing of electric light wires; and the Law Lords had an enforced period of leisure. Through the failure of a large generator at Nelson, the supply of electricity for both lighting and power was recently suspended for a few hours. The Colne and Burnley Electricity Departments are supplying Nelson with the necessary energy for keeping the tramways running. Through the mischievous tampering by a young miner with an electrical installation at a shale mine, another miner, on touching a door handle, received a shock from the effects of which he died almost immediately. At the inquiry at the Linlithgow Sheriff Court, the jury appended to their verdict the view that they did not consider that the young miner "had any knowledge of the likelihood of any fatal termination, or that he meant the result for any particular party." It is time that such ignorance should be replaced by knowledge. Through a fault occurring on an electric-motor, an electrical student named Orr was killed at the Sheffield works of Messrs. Vickers, Ltd., on Oct. 27.

Making Work for the Future.

In the Norwich housing scheme, the houses are lighted with electricity—the outdoor distribution being by overhead wires attached to the chimneys. "The service cable," it is said, "is brought down the chimney through a built-in tube." The service-cable should have a warm time of it. Looking at a photograph of the houses, one is not led to imagine that there will be a considerable demand for current for lighting purposes, or a demand that will justify the capital, maintenance, generating, distribution, and other expenses involved. Judging, too, from the number of chimney stacks, the designer does not appear to have taken advantage of new knowledge as to structural economies to be effected by the use of labour-saving means of heating.

CARBONIZING ILLUSTRATED BY THE CINEMA.

AN interesting addition to the existing methods of propaganda and publicity work, and of instructing students in gas engineering and disseminating a knowledge of gas-works practice, is provided by the cinematograph film which has been prepared and placed at the disposal of the industry by West's Gas Improvement Company, illustrating the working of the Glover-West system of continuous carbonization in vertical retorts.

The film was projected on the screen for the first time at a private meeting held the other day; and it was at once evident that the great difficulties in the way of applying the cinema to this purpose had been overcome to a remarkable extent. It is not possible—at all events, with the apparatus at present available—to photograph the really vital action of the heat on the coal in the retort; but short of this the film shows all the essential operations involved in the construction of the retort-settings and plant, the handling of coal to, and coke from, the carbonizing plant, and the attendance to the retorts in action.

One of the striking features of the Glover-West system, combined with the mechanical handling machinery which the firm have developed to such a high pitch in their installations, as demonstrated by these films, is the entire absence of strenuous manual labour. Indeed, the films are not at all exciting. There is none of the spectacular activity and bustle of the horizontal retort-house. Everything is quiet and orderly. The coal-wagon is pushed along to the tippers, the contents are emptied into the hoppers, and quietly taken away by the gravity-bucket conveyor. Up above in the retort-house the attendant walks along, adjusts the dumper, and each bucket contributes its quota to the storage bunker. On the top stage of the retort-bench, the attendant comes along without hurry, opens the valve, and fills the hopper which is essentially the top portion of the retort. At the same time he plunges the test-rod into the top of the retort, to make sure all is well. At the bottom a few similarly orderly operations discharge the coke from the coke-receiving chambers into the skips of the telpherage, by means of which the coke is transported to the railway or the store. All the principal operations—such as the filling of the producers with coke, &c.—are depicted on the films.

Another film shows views of the well-equipped works at Miles Platting, Manchester, in which the steel and iron portions of the Glover-West vertical retort installations are manufactured. An interesting personal touch is provided by a series of pictures of the workmen and staff leaving the works for the mid-day meal.

Yet another film illustrates the principal processes in the manufacture of the special silica material at the Derbyshire Silica Fire-Brick Company's works at Friden, near Buxton. Here, Nature came to the assistance of the cinema photographer; and the pictures showing the "getting" of the siliceous material and its transport to the works are really beautiful. The views illustrating the preparation of the material, the machine moulding, drying, burning of the bricks and shapes, and finally its packing for "shipment," are remarkably complete.

We said that these films are placed at the disposal of the industry; and we may add that already societies, colleges, and gas committees have arranged to borrow and show them for the instruction of the members and staffs. One copy has been dispatched to America, where this very modern method of propaganda is likely to make a strong appeal.

We think that the thanks of the industry are due to West's Gas Improvement Company for their public-spirited action in being the first in the field with the application of the "Pictures" to the study of gas making.

Temporary Increase of Charges Act.—Orders have been made by the Ministry of Health under the Statutory Undertakings (Temporary Increase of Charges) Act authorizing the Glastonbury Corporation to increase the maximum price charged for gas from 6s. 6d. (under a previous Order) to 6s. 9d. per 1000 c.ft.; and the Harrington Urban District Council from 5s. to 6s. per 1000 c.ft.

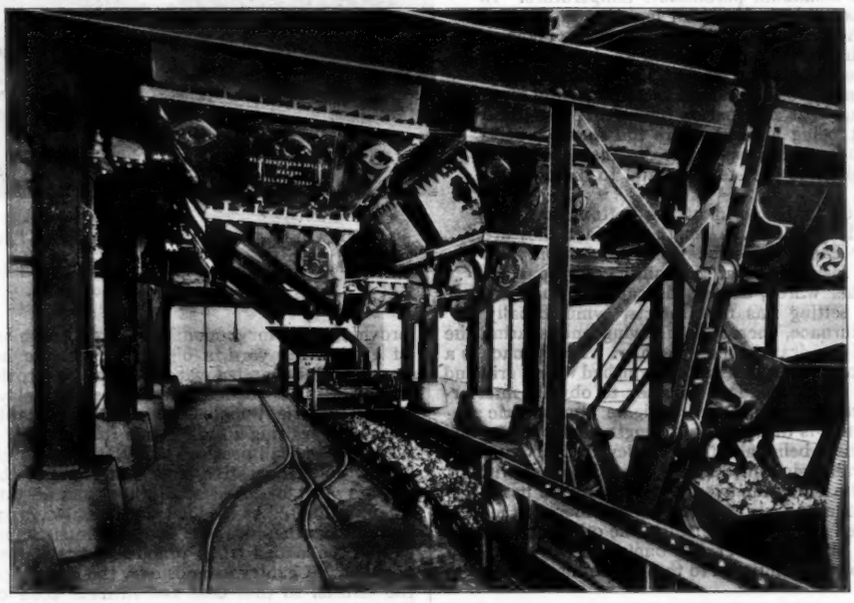
THE "DEMPSTER-TOOGOOD" SYSTEM INSTALLED AT HAWICK.

Steamed Continuous Vertical Retorts.

THE brief account given in the Nov. 3 issue of the "JOURNAL" of the official inauguration of the new carbonizing plant at the Hawick Gas-Works on the Dempster-Toogood system of (steamed) continuous vertical retorts may now be supplemented by further particulars of the plant erected by Messrs. R. Dempster & Sons, Ltd., of Elland, within a period of unparalleled upheaval in the labour and material markets. This installation is of its kind the first in Scotland, and also the first placed on order since the war, which features are specially interesting, as reflecting the enterprise of the Directors of the Hawick Gas Company and their Engineer (Mr. J. D. Keillor), in their determination to adopt with promptitude the latest developments in efficient gas manufacture brought about by the forced economies during the war.

The installation was put into operation last August, and is capable of producing 500,000 c.ft. (2500 therms), and of carbonizing 40 tons of coal, per 24 hours. The bunkerage is of 48 hours' storage capacity, thus obviating much Sunday work. The coal is handled only by machinery, as also is the coke. An electric hoist is provided to give easy access for the men to all levels, which hoist, in emergency to the gravity bucket conveyor, immediately "carries on;" the coal and coke being readily handled by the ball-bearing truck. All gears are driven by electric motive power, the current being generated by a gas-engine, whence the installation is in reality one self-contained gas-making machine, requiring but the coal and the men to control.

The one gravity bucket conveyor runs round the retort-house and bench, so that by one handling coal passes from coal-breaker direct to any compartment of the overhead storage bunkers; or, by means of the travelling filler, coke is taken by one handling, and with the minimum of breeze formation, direct from any retort to any compartment of the overhead storage bunkers, or to the coke screen and bunker, over the yard-level railway siding. Thus the work of handling is economically performed in a cleanly manner. The unique feature of the gravity bucket conveyor is the eccentric spur-gear (Dempster-Toogood patent) which, by compensating for the irregularity of the hexagonal driving drums, permits of the conveyor-links being about twice the normal length—viz., 2 ft. centres. This eliminates at once nearly 50 p.ct. of the knuckle joints, and correspondingly reduces the attendant wear, stretch, and lubrication required. Each bucket is readily detachable without disconnecting the chains, and is of liberal dimensions. The conveyor handles 40 tons of coal or 25 tons of coke per hour, when running at only 48 ft. per minute.



UNDERNEATH THE RETORT-BENCH.

The site possessed the enviable advantages of a high-level (coal) railway 15 ft. above yard-level, and also a yard-level (coke) siding, to use which to the greatest advantage the scheme provides for a future inclined wagon traverser and turntable, which, by connecting the sidings, will give unlimited marshalling for wagons. The subsoils being sandy, with water at about 3 ft. below the surface, a ferro-concrete raft and grillage joists were employed, to spread the superimposed weight of the bench, so that the subsoils are not loaded more than 1½ tons per super foot. The high-level siding, carried on cross-walls and surmounted by a roof, provides an ideal storage, into which coal is dumped with the greatest economy.

The vertical retort-house is 36 ft. wide, 45 ft. long, and 75 ft. high, and is of steel superstructure, 4½ in. brick filled—the brickwork being formed round the steel stanchions. Light and ventilation are secured by open chequer brickwork. The roof is of non-corrosive corrugated asbestos. A noticeable feature of the house is that the ground floor is light, airy, and free; the arrangement of stanchions permitting the men to walk about under the bench with the greatest of comfort.

All power is generated by a 34 H.P. gas-engine of the most modern construction. The governing of the engine is particularly interesting, as the governor apportions the gas to the particular load, whence economy and steadiness of running are achieved, and there is no hit-and-miss or idle stroke. The engine is coupled direct to an electric generator. In the house, preparation is made for the adoption of a future stand-by gas-driven generating set.

The coal-wagons arriving on the high-level siding are up-ended to 45° by an electric-driven pivoted cradle tipper; both axles being raised so that the buffers clear the rails—ensuring a clean discharge in two minutes of any size of wagon having an end door. In this manner, 15 ft. depth of coal is at command ready to gravitate to the coal-breaker with the utmost economy of working. The breaker-pit is basin-shaped; and to obtain the full benefit from both railways, it is grouped beneath the high and low level sidings. To regulate the coal, the pit is furnished with a reciprocating feed, whose motion synchronizes with that of the conveyor, thereby obviating chokes and preventing breakdowns. The coal is passed over a screen, only the lumps too large for use being diverted into the coal breaker, by which means the production of dust and slack is minimized, to the advantage of carbonization. The breaker is of the two-roll type, and the broken and screened coal is fed to the buckets by a rotary filler. The working capacity is 25 to 40 tons of coal per hour, depending on the percentage requiring to be broken.

The "Dempster-Toogood" system of (steamed) continuous vertical retorts consists of a continuously descending column of coal in every conceivable stage of distillation, meeting an ever-ascending atmosphere of coal gas, water gas, and steam—thus setting-up physical and chemical interactions of infinite variety, but all subservient to the prime factors of temperature, time, pressure, and the uniformity of the conditions established and maintained within the interior of each retort. To ensure the maximum efficiency from the retorts collectively, it is axiomatic that each retort should be capable of individual control in all its functions. This is exactly accomplished, since each retort is one complete unit, thus giving the carbonizer the maximum power to construct the conditions required to yield his desired efficiencies from each retort.

Steam pressure in the bench services is governed as a whole to 20 to 40 lbs. Each retort has a separate control cock and ⅜-in. diameter nipple, and by its waste heat dries and superheats its own previously controlled steam. The ingoing steam and the outgoing coke together form water gas, which, rising through the charge, acts physically by displacement to release imprisoned volatiles and conserve the quality of the gas by speeding its exit. Simultaneously, the coal yields its coal gas direct into the rapidly-rising stream of hot water gas, whereby hydrocarbons are not degraded,

but are chemically protected and conserved with an increase of gas, tar, and ammonia yields.

Each retort is furnished with a regenerator adjacent to the waste-heat flue, through which the previously controlled and dried steam is passed on its way to the retort. In this manner, the steam is superheated to a very high degree by the waste heat leaving the setting, with obvious advantage in the formation of water gas, with low CO_2 content. Moreover, where desired, means are provided so that the energy of the ingoing steam is utilized to inject separately generated water gas, producer gas, or other diluents, as preferred, to be superheated on their way to the retort.

In the "Dempster-Toogood" patent setting (it is constructed throughout from one high-class silicious material), each retort having entirely independent combustion flues, it follows that the heats can be checked on any retort at any time it may be advisable, leaving the neighbouring retorts at full working temperatures—a feature of paramount importance to the well-being and long working life of the settings. Also, the vital or active zone of combustion is disposed at some distance from the top of the retort. The setting, having large flue areas, works at 1-10th to 2-10ths vacuum, whence fuel is saved, flue dust reduced, and the cutting and impinging action on the refractories obviated.

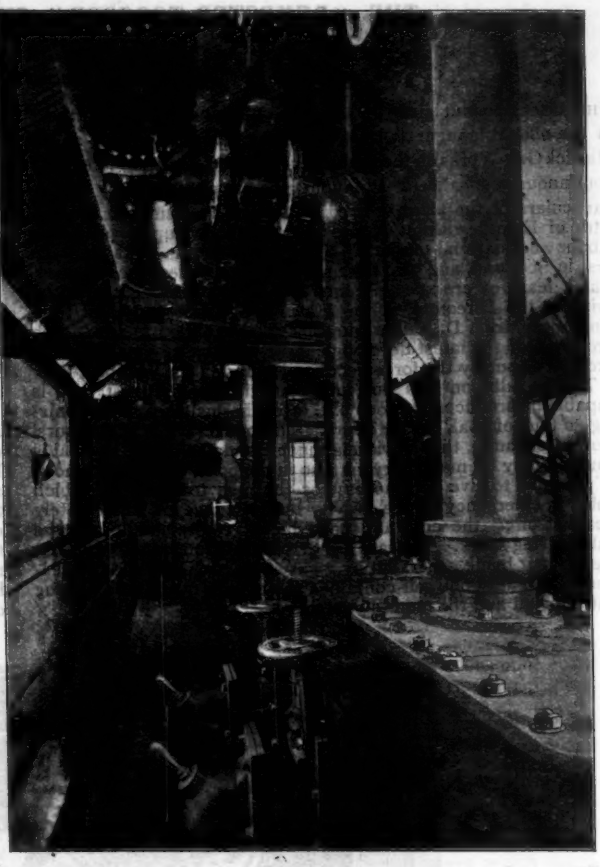
Pyrometers are used to record maximum applied temperatures to safeguard the refractory material. Since all types of settings heated by producer gas must use approximately the same maximum temperature—1300° to 1400° C. = 2350° to 2500° Fahr.—it necessarily follows that they are comparable in the proportions of brickwork subjected to this critical temperature. Technically, therefore, the problem of heating is resolved into the selection of the most all-round efficient disposition for this maximum permissible temperature. In the "Dempster-Toogood" system, all ignitions are at one horizontal plane; hence all pyrometer readings are taken at one eye-level, which renders supervision in its simplest form. Moreover, this system of heating provides symmetrical heating of every horizontal cross-section of the charge, and gives a reduced strain and wear and tear on the refractories; and the maximum heat being applied where the retort is relatively narrow, the heat better penetrates to the core of the charge, with advantage to the steaming and to the coal-gas yield.

The retorts are 60 in. by 20 in. at the bottom, 40 in. by 7 in. at the top, and 23 ft. 6 in. in length. In fact, they are so large that they can be entered from the bottom and repaired from the inside without dismantling any part of the fittings. In other words, as regards capacity they are coke-ovens. Each setting has four retorts, symmetrically spaced round the furnace, thereby conserving and sharing the conducted heat and the draught more equally. The furnace is a special application of the stepped grate, furnished with a grid and shoot for ashes and an independent chimney to obviate interference with neighbouring furnaces and mitigate atmospheric disturbance. Each retort is throughout its length controlled by one damper only; and these being all at one eye-level, supervision and control are considerably simplified and stabilized, so that, without exceeding a given maximum, the average of the applied heats can be raised, with all-round advantage. Also one or more of the four retorts can be worked without detriment to the others.

To act as a spare plant to the gravity bucket conveyor, to give ready access to all parts (additional to the main staircase), and to provide means for economically dealing with surplus coke in times of glut in the yard, a high-speed electric hoist, a special ball-bearing truck, and a yard gantry are provided. The hoist is in line with the bench, thereby saving delays and waste effort negotiating right-angled curves or turntables. The hoist is capable of raising 2 tons at 100 ft. a minute. The truck is furnished with ball-bearings and Dempster's single-pull side discharge doors, operative from either end of the truck. Its capacity is 17 cwt. of coke; so that its gross weight is 30 cwt. (38 cwt. when coaling). As the loaded trucks always pass in one direction to and from the hoist, the several gantries and rails are inclined so that the loaded truck practically gravitates to the discharging position. A gantry extends over the coal-storage bunkers, above the retorts, so that coal and furnace coke can be handled by the hoist at will. Normally, all coal and coke is handled by the gravity bucket conveyor. The object of this large capacity truck is to move large quantities with dispatch should occasion require. To this end, Dempster's locking gear has been attached to the hoist. The truck entering the cage from either side is brought to rest centrally with the cage, and automatically locked in this position. When required, it is simply released by pressure of the foot.

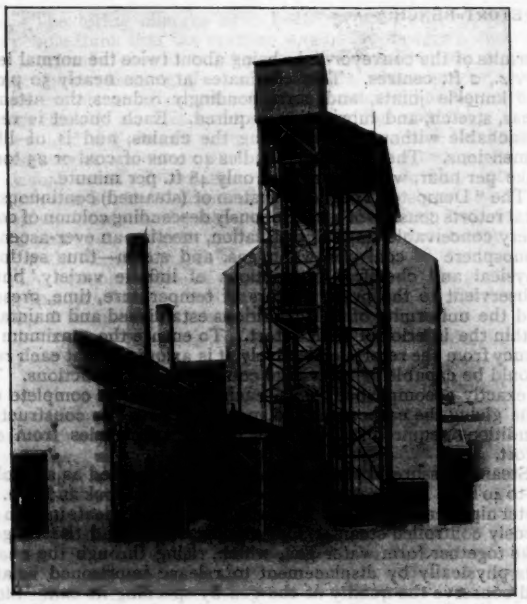
To enable the attendant to manipulate the large truck load to and from the cage with ease and dispatch, it is necessary for the rails to be in exact alignment. To get the desired exactitude without a series of trials and starting and stopping of the motor, the landings and cage are fitted with a trip-gear of Dempster's design, so that the rails are held always in alignment.

A small and neat vertical gas-engine is provided, so that should the electric current fail from any cause, the engine would drive all the coke extractors and maintain the gas manufacture to the extent of the coal in the 48 hours' storage bunkers.



HYDRAULIC MAINS AND SPECIAL OFF-TAKE PIPES.

Completely independent for each Retort. Also showing Retort-House Governor and Automatic Blow-off Valve.



VIEW OF THE INSTALLATION AS COMPLETED.

Misuse of Coal.—The Leeds Corporation Gas Committee organized a lecture last Thursday on the subject of the misuse of coal. The lecturer was Dr. C. W. Saleeby, and the venue was the Town Hall—the Lord Mayor (Mr. A. Braithwaite) presiding. The lecturer stated when he visited the United States on several ocasions he had been much impressed with the cleanliness of the towns and cities, and the freedom from air pollution which existed. In this country, we only got one-third the value out of our coal, though it was a great national heritage. As no more coal was being made, we were living on our capital, and making bad use of it. It would go ill with the people of this country if more healthful conditions and greater regard for the length of life of the inhabitants were not taken in hand.

THERM COST OF CRUDE GAS.

In the "Times Engineering Supplement" this month, there is an article on "Water Gas and Its Constituents." The writer refers to the different methods of producing town gas, and then gives the following table:

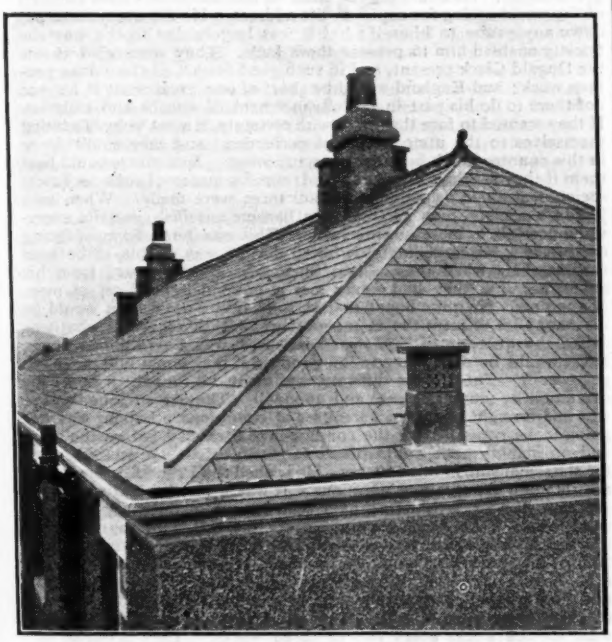
	Efficiency of Process.	Efficiency of Gas Production.	Cost of Crude Gas per Therm.
Straight coal gas (horizontal retorts)	82 p.ct.	53 p.ct.	8·0d.
Vertical retorts (30 p.ct. steaming) .	81 ,,	55 ,,	2·4d.
Blue water gas	50 ,,	50 ,,	4·0d.
Blue water gas (self-steaming) . .	67 ,,	67 ,,	3·0d.
Complete gasification	63 ,,	60 ,,	2·9d.

It will be noted (remarks the writer) that blue water gas production as ordinarily carried out gives the lowest efficiency with the most costly therm; but the opportunities that present themselves will be seen from consideration of the figures which are obtained when the process is made self-steaming—*i.e.*, when the steam required for operation is raised by means of the waste heat issuing from the plant. Providing that plants of the kind are fitted with a self-contained boiler, there is no reason why blue water gas should not commend itself to all gas engineers as a simple method, and one of the cheapest methods, of producing gaseous thermal units. The author also refers to the modification of the constituents of water gas by catalysis—particularly the conversion of carbon monoxide into methane. The practical difficulties in the way of this being done do not encourage much hopefulness of its participation in gas-works processes.

"ALL-GAS" HOMES AT LUTON.

Fitted with "Nautilus" Flues.

A project of considerable national importance, and of great interest to the gas industry, is being carried out at Kimpton Road, Luton, where the Davis Gas-Stove Company, Ltd., are building



A Close View of the Roof—showing the Gas-Flue Terminals and the Small Chimney Stacks for the Coal-Fire in the Kitchen or Living Room of Each House.

eight concrete houses on the "all-gas" principle; coal-grates, coal-flues, chimney breasts, &c., being entirely eliminated—except in the case of the living-room—and their places taken by gas-fires and 12 in. by 3 in. "Nautilus" concrete gas-flue blocks built in the thickness of the walls. The dwellings, which consist of two blocks of four houses each, constitute a unique tribute to the enterprise and versatility of the Davis Gas Stove Company, who not only are completely carrying out, with their own labour, the erection of the houses, but are also responsible for the manufacture of the materials, fittings, &c., employed in the houses.

With the exception of the kitchen or living-room, which is fitted with a 9 in. by 9 in. flue constructed of concrete slabs in pairs, none of the rooms is provided with facilities for the use of solid fuel. The parlour, or occasional room, is fitted with a Davis "N.H." gas interior fire, in a simple, inexpensive, but exceedingly effective mantel and tile surround; and each of the bedrooms is equipped with a Davis "N.H." gas-mantel register. The bath-room is furnished with a Davis geyser, and the scullery with a Davis "N.H." wash-house boiler. Gas lighting is employed throughout.

The concrete blocks of which the 3¼-in. interior walls, as well as the 9-in. (with 2-in. cavity) exterior and party walls, are built, are made on the site; and the employment of these blocks permits of much greater speed and economy in erection than in the case of brick. The houses are finished in Portland cement, rough-cast, with concrete gutters and casement windows throughout; while, as to the interiors, it should be mentioned that all the walls are tastefully distempered, and that, in the case of the ceilings, plaster has been superseded by asbestos slabs.

From the national standpoint, as we have said, the venture is an important one; for the methods adopted in the erection of the houses have at least fully demonstrated how greater speed and economy in construction can be attained. The actual structural saving effected by the utilization of the "Nautilus" concrete flues, by means of which projecting chimney-breasts, large brick chimney-stacks, &c., are eliminated, is a factor the value of which it would be difficult to overrate, while of even greater importance is the corresponding saving in cost of construction.

Worthy of special emphasis is the additional comfort provided by the existence in the bedrooms of gas-fires, the use of which will remove all the frigid discomfort of getting-up and dressing on winter mornings. And, as will be readily perceived, the scheme has this special interest to the gas industry—that the installation of gas-fires in conjunction with the "Nautilus" flue blocks entirely puts it out of the power of the tenants to replace the gas-fires by coal-grates.

Finally, it should be mentioned that the Davis Gas-Stove Company have recently secured a contract to construct thirty more such houses outside their own town—a tribute alike to the all-gas principle, and, in view of the exceedingly keen local competition for the work, to the methods and resources of the Company.

SIXTY YEARS AGO.

[From the "Journal" for November, 1860.]

Coal Rises Then.—In consequence of the great demand for gas coals, the owners of the Durham gas-coal collieries have resolved to raise the price 6d. per ton; and the demand is still such that another 6d. will probably be added shortly. What a commentary on the principle which seeks to base an estimate of the rateable value of a gas-works upon the experience of one year!

Unstatutory Companies and Street Openings.—An action of considerable importance to gas companies was tried in the Court of Queen's Bench. The Equitable Gas Company, having reason to doubt the solvency of one of their customers, required a deposit of £5 as a guarantee; and, upon its being refused, an agent of the Company entered the premises and cut off the supply of gas, by detaching the service-pipe from the meter. The matter fell into the hands of a sharp-practised attorney, who, seeing that a trespass had been committed, and that it was a case in which a jury might be so worked upon by a skilful advocate as to induce them to give a verdict in his favour, with sufficient damages to carry costs, took the case up, and forthwith commenced an action, of which one of the counts of the declaration set forth the trespass committed. Several other grounds of action were set out, but that of trespass was substantially the only one relied upon; and on this count, in the opinion of the Judge, a case was made out, and a verdict for the plaintiff, with 40s. damages, was taken, subject to the opinion of the Whole Court, upon a case stated. The legal trespass is, however, we apprehend, too clearly established to admit of any doubt that the Court will ultimately confirm the verdict; and, if so, gas companies who are without statutory powers to break-up the pavement outside the premises, are placed in the awkward predicament of being unable to discontinue the supply of gas to a defaulting consumer. If they enter the premises without permission of the tenant, they are liable to be sued for a trespass; and if they break-up the pavement, they are liable to an indictment for a nuisance. It is fortunate for the hundreds of gas companies carrying on their operations in this country without statutory powers that the commercial morality of their customers generally prevents them from taking advantage of the illegal status of these companies. We would, however, signalize one instance, in which a country attorney has for some time past refused to pay for his gas, on the ground that a former owner of the gas-works had promised him a gratuitous supply; and the present owners, being without statutory powers, have not dared to open the pavement in order to disconnect the service-pipe from the mains.

Importance of Developing Petrol Substitutes.—Stating that the Sub-Committee appointed by the Central Profiteering Committee to investigate the prices and profits of motor fuel have now concluded their sittings, and have presented their final report, "The Times" say they understand that the Committee adhere to their previous conclusion that the prices now current for petrol are unduly high. As, however, production is almost entirely in foreign hands, no immediate remedy can be suggested; and the Sub-Committee lay stress on the importance of collaboration on the part of non-producing countries interested in maintaining petroleum supplies, and the development of substitutes, such as power alcohol, benzole, and other coal distillates, and shale-oils.

SOCIETY OF BRITISH GAS INDUSTRIES.

Annual Meeting in London.

The members of the Society held their Autumn Meeting on Thursday last at the Midland Grand Hotel, St. Pancras, N.W. Before the general business was transacted, members lunched together; and when the President (Sir Arthur Duckham, K.C.B.) took the chair, the tables showed an attendance strength exceeding, if anything, former records for the second meeting of the year. The members gave good welcome to their old friends and Past-Presidents, Sir Dugald Clerk and Sir Robert Hadfield, Bart., with whom were the Chairman of the Council (Mr. Cyril George Davis), and the Vice-Chairman (Mr. Frederick G. Cockey).

Before the members left the tables, a few toasts were proposed. That of "The King" was first honoured.

THE PRESIDENT.

Mr. CYRIL G. DAVIS proposed the toast of "Our President." He remarked that this was no mere formal toast; it was one which every member would support with due sincerity and good will. They knew the great service Sir Arthur had rendered to the country, not only during the war, but since. They all knew, too, the great help he had been to the gas industry; and they were indeed fortunate to have him as their President. He had always taken the keenest interest in the affairs of the Society, and was ever most willing to render every assistance he could for its benefit. He had attended the Council meetings from time to time; and he had been to them a tower of strength in their deliberations. He occupied a unique position, inasmuch as this was the second year he had been President. A more conspicuous fact—a fact which would encourage those who had high ideals—was that he was the only member who had occupied the proud position of President of the Society. Those who intimately knew Sir Arthur were aware that he possessed the demeanour of unassuming courtesy and kindliness. Despite the fact that his name had become a public one, and in spite of the honours he had richly deserved, it was gratifying to know he still retained his old manner, which was an indication of the big man. [Applause.] He (Mr. Davis) heard some time ago an expression applied to another man which truly described their President: "He has the mind of a great man, but the heart of a child." Sir Arthur would be vacating the presidential chair shortly. This was much to be regretted; but the members had the consolation of knowing he would always take an interest in the work of the Society, and always be available when they required his advice and guidance.

"THE PROSPERITY OF THE GAS INDUSTRY IS OUR PROSPERITY."

The PRESIDENT, in thanking the members, said he had expressed to them at other meetings his great pride in being their President. He was not born in gas; but he was educated in gas, and had his being by gas. Naturally, therefore, the greatest interests in life were those of the gas industry, and the developments which were at hand. He had attended the meetings of the Society for many years; and the greatest happiness in connection with them was to see the feeling among the members become, as the years went on, more and more consolidated. To-day they discussed openly and frankly matters which they would have been frightened to mention but a few years ago. To-day they held out a helping hand to each other, whether competitors or not. [Hear, hear.] It was a fine spirit that had been engendered by their association together; and he hoped to see it grow still stronger. They did not meet for the purpose of "doing down" their clients; they met for the good of the gas industry. Their outlook was this: That what was good for the gas industry was good for the individual contractor. The prosperity of the gas industry was their prosperity. The whole of their work was coming more and more to this point of view. In all they did, their action was governed by what it would do for the gas industry.

A NEW AND EXTENDED LIFE.

Mr. F. G. COCKEY said it was a pleasure to him to be called upon to propose "The Past-Presidents." They were fortunate in having two of them there that day—Sir Robert Hadfield and Sir Dugald Clerk. They had hoped to have had Mr. Balfour Browne with them; but unfortunately he could not be present. They congratulated themselves on their illustrious list of Presidents. Within the knowledge of everyone of them was the immense service done to the Society and the gas industry generally by the way Sir Robert Hadfield had championed the use of gas for industrial purposes, and by what Sir Dugald Clerk had done by his vigorous defence of the gas industry against the unjust attacks of the electricians. He had not by any means disparaged or run-down their electrical competitors; but there was a certain section who had made an unfair attack and had spread abroad incorrect information. It was this that Sir Dugald Clerk had combated.

Sir DUGALD CLERK, in reply, said he was greatly indebted to the members for so very cordially drinking his health along with that of his friend Sir Robert Hadfield. It was a great pleasure to him to be there. He had taken an interest in the Society since it started. He was its first President; and, like Sir Arthur Duckham, he served in this capacity for two years—in 1906 and 1907. His successor was Sir George Livesey. Since the start of the Society, a great part of the programme which the Council outlined at the beginning had come to fruition; and the cordial terms in which the Society now carried on its work with the Institution of Gas Engineers was a great testimonial to what was being done in the Institution and in the Society. Sir Arthur Duckham had said very truly that the members were all devoted to the interests of the gas industry. On one side the members devoted their interests to manufacture, design, and invention; and on the other they were also, with the Institution of Gas Engineers, interested in the general problems of the production and distribution of gas. It was also a gratifying circumstance to him that he was the President of the Institution at the last annual meeting, when, for the first time, he believed, they had quite a valuable paper on carbonizing from the Society of British Gas Industries. It was a very good start to make, and a very useful thing indeed. He could speak for the members of the Institution. They were delighted to have beside them at all times such a pamphlet—book he might call it—on carbonizing, to see the progress that had been made. Sir Arthur Duckham had been telling him of other things in which he had been endeavouring to make progress for the gas industry. It was a great pleasure to him to find that the discussion as to the part of the gas and electrical industries in the conservation of coal had resulted in a new legal departure—had resulted in putting the whole gas industry in the position of making a fresh departure from the old state of things—a position of opportunity it had not had since the beginning of the gas industry. It had now the chance of a new and an extended life. They had also made it clear to the general public that the gas process was not what they supposed it to be—effete and highly uneconomical, but on the contrary it was a very economical process. The gas industry would go forward in its good work, and improve efficiency, and so help to lengthen the industrial period of industrial England. The gas engineer would be able to extend the period of industrial prosperity for the country. He thanked them all for their kind wishes.

HOW TO FACE THE FUTURE—VALUE OF WORKS COMMITTEES.

Sir ROBERT HADFIELD said he also greatly appreciated the kind remarks that had accompanied the toast, and the reception it had received. He had never had greater pleasure in filling an office than while he was President of the Society. But he asked the members not to imagine any advantage there was in this was all on their own side. He learnt a great deal through being their President. He saw before him a new set of problems. Therefore, he was indeed thankful they had elected him their President. He did his best in presenting them with a large volume on a number of subjects in which they were concerned. When he undertook the work of preparing his address, he was a little seedy. He had to fill up his time; and, to his astonishment, he became very much taken up with the work. He tried to bring together a number of facts which he thought would prove useful. He could only say that he had had letters from all parts of the world asking for copies of the address. He did not wish to put down any praise to himself; but it was largely due to the way the Society enabled him to present these facts. They were glad to see Sir Dugald Clerk present, and in such good form. He had done yeoman work; and England would be short of one great man if he was not there to do his part in the advancement of science and technics. If they wanted to face the future with certainty, it must be by educating themselves to the utmost pitch of perfection; and they could do so in this country much better than in any other. No country could beat them if they set their minds to it. It was by means of such technical societies as their own that great advances were made. When men joined a society such as this, they became unselfish, and did everything possible to increase knowledge. This was the true way of facing the future. He exceedingly regretted that he was unable to be with the members when they visited Sheffield. But he heard from his colleagues that they had never met a more delightful set of men. [Laughter.] He quite hoped that on some future occasion it would be his happy lot to meet the members there. With regard to what was called the question of capital and labour, it was a very difficult one; but it would be a very happy thing indeed if they could find means to get over it. Though the difficulty was great, he thought it could be overcome by mutual respect and goodwill. They must recognize the war had brought about a different set of conditions. Labour was not going to be content with the conditions that existed before the war; and no man present would blame labour for that. It was a matter for statesmanship in this country. He wished the Prime Minister knew a little more about labour questions. It was a pity he had not about him men like Sir Arthur Duckham, who knew something about labour conditions. There were sometimes cases where, if there was only some member of the Cabinet who really had personal experience in handling labour, much difficulty would be avoided. His own Company at Sheffield were trying Works Committees. They had 7000 or 8000 men; and they elected, in parliamentary fashion by votes, a body of (say) ten men to act as a Works Committee. This body met the management of the works every two or three weeks. They brought forward and discussed various matters. Take, for instance, the problem of the heating of the shops. There was not a man present in that room who, if he went to his office on mornings such as that and did not find the fire lighted, but would want to know the reason for the neglect. Labour had also the right to be warm while at work. The men had a right to be surrounded by reasonable conditions; and in his view, from what he knew of the practical results so far, Works Committees were going to do a great deal of good. They heard the first of any trouble through the Works Committee; and they were able to stop it at once. They tried to be reasonable. The employer was like the average workman—he was out for reasonable conditions. They were both prepared to go a long way to meet each other. Let them start on the right road; and they would find the good old times come again, when they could "Produce, produce, produce." That was his motto. [Applause.]

THE BUSINESS MEETING.

The Business Meeting was subsequently held, the PRESIDENT (Sir Arthur Duckham) in the chair.

CHAIRMAN'S REPORT.

The PRESIDENT called upon the Chairman of the Council to read his report upon the work of the Society and other events affecting the members that had occurred during the past half year.

The CHAIRMAN read the report as follows:

As Chairman of your Council, it is my duty now to give you a short account of the work of the Society for the past half year, and of questions which affect the interests of the members.

Before, however, dealing with these, matters of a personal nature have to be recorded. In the first place, since our last meeting, our ranks have been made the poorer by the passing of the following members from the scenes of their activities:

Mr. Alexander Mackay, Chairman of Alder & Mackay, Ltd.
Mr. P. N. Cunningham, General Manager of Stewarts & Lloyds.
Mr. T. G. Marsh, of Manchester, one of the founders of the Society, and a very active worker in the earlier years.

A brighter matter is that cordial congratulations can be extended to the following gentlemen for the additional and well-merited honours bestowed upon them.

Sir Arthur Duckham, K.C.B., who has had the honour of the Cross of Officer of the Legion of Honour conferred upon him by the President of the French Republic, for War Services.
Sir Alfred Keogh, G.C.B., G.C.V.O., who has had the Degree of Doctor of Science conferred upon him by the University of Oxford.
Mr. Fred J. West, C.B.E., who has been elected an Alderman of the City of Manchester.
Mr. Thomas Duxbury, who has been elected Mayor of Darwen.
Mr. Albert Cliff, of Messrs. Williamson, Cliff, Ltd., who has been elected for the second year Mayor of Stamford.

The Industrial Position—an Improved Outlook.—Industry has been greatly impeded of late by industrial unrest. Overshadowing all else for the time being has been the coal strike. This is now happily settled; and it is hoped by your Council, as by us all, that there will issue from the deliberations that are about to take place a plan for the coal industry of increased wage and profit participation (in which it is hoped the consumer will not be overlooked), which will be the reward of a mutual endeavour to enlarge production. The strike no doubt has been a serious loss to industry and the country generally; but if out of the loss and temporary chaos permanent good comes, the country will be better off than it has been under the continuous uncertainty and disturbances of the past. As to industrial labour generally, there are signs of a better spirit and better feeling spreading through the land. We hope sincerely for a development of these signs, and that the result will be the increased production which is so vital for the Empire, with its tremendous burden of financial responsibility. Notable pronouncements on this subject have lately been made by prominent trade union leaders. The address of our President, Sir Arthur Duckham, at the annual meeting, dealt with the industrial question both from experience and deliberate thought, and gave the members much food for reflection. Much of the industrial unrest is created by the disorganization, higher costs, and reduced production that have come from the new policy of the dominating extremists in certain of the trade unions. There need be little fear of abnormal unemployment if the policy was the "pull-together" one advocated by the Prince of Wales, and not one which acts as a disintegrating force.

Annual Meeting.—The Council have pleasure in recording the unqualified success of the annual meeting, at the Sheffield University, in June. The visits to Messrs. Walker and Hall's and Messrs. Hadfields' works on the second day were of intense interest to the members, and what was seen there will be a lasting memory. We are indebted to the Directors of Messrs. Hadfields, Ltd., and the University authorities for the generous hospitality extended to us.

Paper on Carbonization.—The Society contributed a paper on carbonization, with drawings, at the annual meeting of the Institution of Gas Engineers in June. It was read by Mr. Samuel Cutler, jun., to whom your Council feel the members of the Society are much indebted for the work he did in connection with the compilation. The paper has been referred to by several engineers as a veritable text-book on the subject, and as a unique record of current constructional practice in carbonization plant.

Gas Regulation Act.—During the past year, the Gas Regulation Act has been placed on the Statute Book; and this measure your Council recognize is one of great significance to members of our Society, and should not be passed over without some reference in the present report.

The Act proposes to place the whole gas supply industry upon what is known as the heat-unit basis of charging. It also gives to each gas undertaking the right to declare the calorific value of gas which will best meet its own particular economic conditions, and further it provides for considerable facilities for extending areas of supply and for bringing about amalgamations of the smaller, and therefore the less economically producing, gas undertakings with the larger ones.

All these features are important to us as manufacturers of plant or gas-using appliances. The second one, relating to the optional determination of the standard of calorific value by each gas undertaking, is the one of immediate importance to the members of the Society.

It is clear to the Council, no matter to which section of the Society the members belong, that this Act will be beneficial to us, and will therefore claim from us our best energies in working with the gas-supply industry to make the Act a complete success, and to enable gas suppliers to add to the popularity of gas. In this direction our interests lie.

In the "GAS JOURNAL" for Oct. 20, it was suggested that the Chairman of the Council of the Society should take "an opportunity of showing the gas industry that the Gas Regulation Act and all that it foreshadows have a large place in formulating new manufacturing policy and practice." Your Council are of opinion that they may claim that members of the Society have already done a good part in this direction.

Gas Production.—The paper on carbonization which our Society contributed to the last meeting of the Institution of Gas Engineers afforded clear evidence that our plant manufacturers have made developments which facilitate the increased production of British thermal units per ton of coal carbonized, and thus have brought about an appreciable economy in the cost of thermal units. The Council may mention the development of the process of steaming in vertical and horizontal retorts; also the improvements in the production of plant for water gas manufacture. Complete gasification, and the utilization of dual process plants, are other directions in which members of the Society have been operating. We look with confidence to further developments in which members will be taking their part.

Gas Lighting Burners.—In this direction the burner makers already provide the means of regulation for a large range of gas qualities, and any considerable reduction of quality can be readily met by substituting larger gas-injectors. The Council have no doubt that, as soon as there is a more explicit definition of what is required, the gas-lighting burner makers will devote themselves to experimenting with the view of securing the highest efficiency possible under the changed conditions.

Gas-Heating Appliances.—The makers of these are fully alive to the need of providing ample regulation for a very large range of gas qualities, and information is to hand which shows that in other directions—such as by the introduction of interchangeable burner nozzles—they have made changes in design so as to be well prepared for any eventuality in connection with gas quality.

Gas-Engine Makers.—Little need be said in this regard, as the Presidential Address to the Institution of Gas Engineers last June of our own first President, Sir Dugald Clerk, together with various speeches he has made on the subject, show that the gas-engine makers heartily welcome the trend of gas manufacture to lower calorific values per cubic foot. In view of the high efficiencies obtained by gas-engines on low-grade gases, nothing more need be said under this heading.

Gas-Meters.—The Council must congratulate the gas-meter section upon the success of their work in conjunction with representatives of the Institution of Gas Engineers, and of the Association of Statutory Inspectors of Gas-Meters. Clauses in the Gas Regulation Act show that the testing of meters is now to be placed on a basis conforming with modern conditions of gas supply, and the examination of meter inspectors will ensure that the testing will be in the hands of fully competent men. The Council consider that this alone is an excellent piece of work in the interest of the gas industry as a whole.

Contract Difficulties.—A Joint meeting of Sections 1, 2, 3, 4, 9, 11, and 12 has recently been held to discuss the difficulties which have arisen in connection with contracts; and a Committee has been formed to consider the matter further.

Report from the Meter Section.—The Joint Committee of the Institution of Gas Engineers and the Society on the Life of Gas-Meters are continuing their investigations into the chemical factors affecting the life of meters with the assistance of Mr. J. G. Taplay, and a further interesting report from him may be anticipated at the next annual meeting of the Institution. Increased interest is being taken in this very important matter by gas engineers throughout the country.

The new standard list of sizes of dry meters has been approved, and will come into force by Jan. 1, 1922. It was felt that sufficient time must be allowed for the change, though probably most makers will be working to the new list before the date named.

A very important matter has been engaging the attention of the Committee—viz., the revision of the statutory rules for the testing of meters with a view of getting the provisions of the Sales of Gas Act of 1859 brought into line with modern conditions of gas supply. Conferences have been held with the statutory inspectors and the local testing authorities, and recommendations made to the Board of Trade. In view of the passing of the Gas Regulation Act, which authorizes the Board to make regulations for the testing of meters, a deputation waited on the Board who gave the matter their careful consideration, and the recommendations have now been adopted. The regulations will therefore be issued, and will come into force on Jan. 1, 1921, superseding the present Sales of Gas Act.

Refractory Materials.—The Joint Committee of the Institution of Gas Engineers and the Society are, with excellent results, continuing their work on refractory materials research.

Gas Lighting.—The Council have recently entered into an arrangement with the Illuminating Engineering Society in respect of the formation of a Joint Committee to keep in touch with all developments in gas lighting; and we trust this will be of service to the members of the lighting section.

Meetings with Other Bodies.—The Society has been represented at the following meetings:

Conference on Chemical Engineering, arranged by the British Engineering Standards Association. On this occasion it was decided to form a Sectional Committee on Chemical Engineering, of which our President has been appointed Chairman; and we shall also be represented upon it by one of our members.
Imperial Chamber of Commerce in connection with the League of Nations. This is a very important matter, and one which is having the careful consideration of the Council; but it is not sufficiently advanced to report to the members.
London Municipal Society conference on high rates. The Society was also represented on the deputation recently received by the Chancellor of the Exchequer, Minister of Health, and the President of the Board of Education.

Re-Grouping.—The question of the re-grouping of the sections referred to in the annual report has been under the careful consideration of the Council; but in view of the difference of opinion among the members of the Society generally, it has been thought well to defer the matter for a time.

Federation of British Industries.—Members are reminded that, as the Society are now members of the Federation of British Industries, it is very desirable that any member who has matters to bring forward in which it is thought the Federation would be of help should communicate with the Secretary of our Society, so that the same can be put forward. In this connection, it should be mentioned that, at the request of some of the members, the Council are now collecting data to put before the Federation as to the difficulties with the Railway Companies—for example:

The time allowed for making claims for damage in transit.
Suggested increase in the Companies' liability for goods not insured.
Any other matters.

British Commercial Gas Association.—The Council have had under

serious consideration the question of increased contribution from the Society to the funds of the British Commercial Gas Association, and have decided strongly to recommend the respective sections at least to double the present subscriptions.

Quarterly Bulletin.—The Council have decided in future to issue a "Quarterly Bulletin" of the work of the Society and matters of interest to members. Several members have suggested that something of the kind is desirable, so as to keep them in touch with what is going on. The first number will contain the report of the autumn meeting; and it is hoped that members will communicate matters of interest to the Secretary from time to time, so that they can be recorded.

The PRESIDENT said he thought they might congratulate the Council on a very full year's work. Perhaps he might be allowed to say a few words on one or two points. He thought the report showed an increase in co-operation among themselves. He was sorry the report could not say that the re-grouping of the sections had been carried out. He hoped the sections concerned in this re-grouping would meet together, and make the sections stronger than they were to-day. He was glad the Council were proposing to strengthen the position of the Society with the British Commercial Gas Association, who had done fine work indeed, and was undoubtedly operating with good effect in the popularization of gas. He thought the paper they read before the Institution of Gas Engineers opened out a new era, in that they had been asked to enter the sacred precincts, and show they could contribute assistance to the Institution. He was certain this should be continued in the future; and the closer the working, the better it would be. A point, he was sorry to see, that had not been mentioned by the Council, was the closer working of the Society with the National Gas Council. He thought they had got as a Society to urge their Council to take steps to secure closer association with the National Gas Council than they had that day. Such closer association he believed could be secured. They were not going to beg humbly for it. But he thought they could show that a more intimate alliance of the Society with the Council would be a great benefit. As to the proposed "Quarterly Bulletin," this was going to be an absolute failure unless members of the Society would assist it. These bulletins were difficult things to run. It would be a useful thing if they all tried to help it—if they raised points with the editor that were of interest to the members. It would then be a means of keeping in touch with one another between the half-yearly meetings.

Mr. H. M. THORNTON said, as an old member of the Council, he should like to congratulate the present Council upon their excellent report. He believed it was the fullest that had ever been presented. Their congratulations were due to those who had composed it for the excellent way in which it had been done. He moved that the Chairman and Council be heartily thanked for the report.

Mr. A. P. MAIN seconded the motion, which was unanimously carried.

THE CHANGED CONDITIONS OF INDUSTRY.

Mr. CYRIL G. DAVIS (Chairman of Council) then read a paper on the above subject. This will be found below, with a report of the discussion which followed. The paper and the discussion occupied the whole of the rest of the sitting; but both the prepared contribution and the experiences it evoked make highly interesting and instructive reading.

On the invitation of the Chairman of the Council, members afterwards had tea together.

THE CHANGED CONDITIONS OF INDUSTRY.

By CYRIL G. DAVIS, M.Inst.M.E. (the Chairman of the Council)

[A Paper read before the Society of British Gas Industries.]

Gentlemen,—The subject which I have selected for my address to-day is "The Changed Conditions of Industry." It is a theme to which, I think you will agree, the ablest might find it difficult to do justice in the brief time which is at my disposal. I cannot hope, therefore, to do more than skim the surface. But I believe that the changed conditions with which I propose, however inadequately, to deal, are of such wide significance, and are so much borne in upon us in our commercial intercourse, that, while my views may not be unanimously accepted, I may at least anticipate a sympathetic hearing.

Now what are the changed conditions of industry which we are encountering at the present time, and what are the new problems to which it is our duty to direct attention? To answer these questions, one must first of all survey briefly the industrial position as it presented itself during the period prior to the great upheaval of 1914, when conditions were what was known as normal. At that time, the slowly-operating process of evolution was working its own changes, beneficial and otherwise. Yet it is not too much to say that the five years of war, which arrested development in so many spheres of activity, wrought a miraculous transformation in the industrial arena—a series of changes that, but for the unprecedented conditions which gave rise to them, would certainly not have been effected in our time, and, indeed, might never have come about at all.

I propose, then, to state, under a few comprehensive heads, what, in my view, were the salient features of the industrial situation in the early part of 1914, and to enlarge upon them later in an endeavour to point the contrast which the changed conditions now seem to me to present. The pre-war period may, I think, be reasonably described as an era of, or as marked by:

(1) Private enterprise.
(2) World competition and unrestricted markets.
(3) Economic regulation of wages and hours.
(4) Cheap commodities, and comparative abundance of raw materials.
(5) A relatively high standard of production.
(6) Sound currency and normal exchanges.
(7) Reasonable credit facilities.
(8) Sufficiency of labour, free migration, and fluctuating phases of unemployment.
(9) Reasonable housing accommodation—partly of good and partly of inferior types.
(10) Growing consciousness by labour of its corporate power on the one hand, and trade combinations and capital aggregations on the other.

And, may I add, the whole industrial situation was overshadowed, perhaps, by a growing sense of insecurity, arising out of the fateful trend of world politics destined, as it turned out, to culminate in the war?

PRIVATE ENTERPRISE.

Taking my first point—that the pre-war period was one of private enterprise. I have given precedence to this because, while the area of private enterprise is neither over nor its end even remotely in sight, it does seem to me that State control of industry during the war, and its partial continuance since—compelling as the necessity for it no doubt was and is—has resulted, directly and indirectly, in some of the most disturbing of the many changes since 1914. Whether State control is beneficial to the community or otherwise is a consideration quite outside my present scope; but I could scarcely do justice to my subject if I did not refer to the enormous influence which Government control of two such vast undertakings as the mines and transport, coupled with the enormous power now wielded by the Ministry of Labour, must necessarily exert upon industry in all its ramifications. It cannot be denied that, even under the smoothest conditions of peace, the active participation of the State in direct industrial responsibility, and its employment of large bodies of organized labour, would have been an event of the greatest possible import; but when such a development has to be considered in relation to the many other abnormal factors of the present industrial situation, its significance is, in my opinion, infinitely multiplied. For the State, with the Exchequer to fall back upon, is under no compulsion to conduct its enterprises on the strictly economic principles which the stress of competition constrains private ownership to respect; and, as we have already seen in the case of coal and transport, any deviation from these principles in the matter of labour, remuneration, and selling price of output or service must inevitably react upon the conditions controlling other interdependent branches of industrial activity.

Indeed, I do not think it is too much to say that this invasion of private enterprise—limited though it be—has had the effect, as compared with 1914, of undermining in varying degrees the economic basis upon which the whole of the industries of this country were then conducted. And the change is, to my mind, one of vital significance, and one which our industries may have occasion to deplore. The pre-war period was marked industrially by keen world competition and the advantage of unrestricted markets—conditions which, I think it must be admitted, do not now exist to anything like the same extent.

WORLD COMPETITION AND UNRESTRICTED MARKETS.

One obvious result of the war has been to remove temporarily—"temporarily," be it marked—from the industrial arena the competition of nations whose activities seven years ago we in this country had most reason to respect. And this fact cannot be ignored in any consideration of the changed conditions of British industry. Competition, which, as we all know, may exasperate at times, is universally recognized as a healthy industrial ingredient; and to the extent to which world competition was in fact good for us prior to the war, we are (whether we recognize it or not) the worse off for its partial cessation now, although I do not overlook the fact that during the period of reconstruction, which must continue for some time yet, it is an advantage that we should not be unduly hampered by the activities of our rivals. When world competition is restored, if what has happened in regard to our economic basis places us in a worse position than other industrial nations, then our power of competition will be weakened; and that is a contingent position which not only British capital, but British labour, cannot contemplate with equanimity.

While, as I have said, the war has curtailed competition, it has also restricted to some extent our potential markets. This has come about in two ways: First, and more directly, by removing a large area of Europe from the present trading possibilities of this country; secondly, and perhaps more serious and permanent in its results, by impoverishing the nations of the world, and reducing the average comparative purchasing power of their respective peoples. Only the fortunate few can afford to maintain their pre-war conception of essential comforts; and it is quite certain that the self-discipline of "doing without," which has now to be practised by the vast majority, is having, and will for long continue to have, its reflex in a general reduction of that popular demand which is the economic complement of industrial supply.

ECONOMIC REGULATION OF WAGES AND HOURS.

My next point is that of the economic regulation of wages and hours, which I think may be said to have more or less governed industrial conditions in 1914. Wages and hours are the fundamentals of industry; for no competitive commodity, whether raw material or finished product, has any real value except in relation to the labour expended upon it. It is to some extent true that wages and hours are under all conditions economically regulated; but I think it may be shown that this is much less the case now than in 1914. The period of Government control, when the State may be said to have been the employer of the preponderance of labour throughout the country, was one in which every interest was subordinated to the winning of the war. Continual rises in the cost of living, due mainly to food shortage and State appropriation of other essential commodities, rendered it necessary to placate labour by periodical increases and bonuses, which would have been justified under no other conditions than those which then obtained. Indeed, the Government continues to exercise the virtual control of wage standards; and the current rates in most trades now rest upon an economic basis only to the extent that reduced output, due to a great variety of causes, enables the increases to be recovered from the consumer. I think it will be agreed that this abnormal condition of things presents a great and disturbing contrast to the basis upon which wages were regulated in 1914; and it is my impression that the time must come when labour itself will recognize that a point has been reached at which further wages concessions can only be considered, and only be justified, in immediate relation to an increase of output. For, though abnormal conditions may for the time being obscure the play of economic forces, these forces are ever steadily operating, and must eventually restore the balance as between the worker and the community as a whole.

Another factor in the wages and hours question is the curtailment of world competition which victory secured for us. It will be apparent that England's favourable position in respect of so many of the world's greatest needs has rendered it possible to grant to labour concessions in the matter of wages and hours which it might very probably have been impossible to consider were we to-day in the same keenly competitive position as obtained in 1914. And to my mind this is one of the most difficult problems of the near future. What has been done with ease in abnormal circumstances will be very difficult to undo as the waves of international competition once more swell.

CHEAP COMMODITIES AND COMPARATIVE ABUNDANCE OF RAW MATERIALS.

My next comparison between present conditions and those of 1914 is in respect of the pre-war cheapness of commodities and the comparative abundance of raw material. That we did, before the war, enjoy a long period of such advantages will, I think, be admitted. It is my desire to omit from this address anything which might give rise to controversy, political or otherwise. But this I may venture to say—that, whether for good or ill, our free-trade policy did have the effect of bringing to this country, at a low cost to the purchaser, an abundance of the things it wanted, whether for manufacturing purposes or for personal use or consumption; and I do not think the purchasing power of the humble penny—no longer to be deemed the British spending unit—was ever so high as in the months preceding the Great War.

A RELATIVELY HIGH STANDARD OF PRODUCTION.

While the present high prices of all commodities, contrasting phenomenally with pre-war cheapness, has an important bearing on the labour position, nevertheless industry is perhaps more intimately concerned with the present world-shortage and greatly enhanced prices of those raw materials upon which it depends for its very existence. The raw material difficulty, which manufacturers almost without exception have for so long experienced, is not the least of the many anxieties which the changed conditions have thrust upon those responsible for the direction of large productive undertakings. Shrewder foresight, wider acquaintance with possible sources of supply, and sounder buying judgment are required now than might have sufficed prior to the war, if work is to be continuous in the many departments and shops which it is commonly found necessary to organize for the economical production of any given class of goods.

The present difficult conditions will probably improve as time goes on, and as the recovery of the impoverished nations is gradually accomplished. But the serious fall in the rate of output, now universally manifest, must for long continue to overshadow and aggravate the industrial position. This universal reduction in the standard of output is in itself one of the most important factors of the changed industrial conditions—so important, indeed, that, could we by the wave of some magic wand restore instantly the pre-war standard of output, the benefit that would thus be conferred upon industry and humanity at large would be enormous.

SOUND CURRENCY AND NORMAL EXCHANGES.

Dealing now with the question of sound currency and normal exchanges. Prior to the war, sterling was the world standard, and London the financial heart of the globe. With one exception among the belligerent nations, Britain may still claim pre-eminence in respect of financial stability; but it cannot be doubted that industrial conditions have been profoundly influenced by the gradual depreciation of currency which has resulted from the war. With the purchasing power of the sovereign now under 10s., pre-war conceptions of value have been utterly annihilated; and new standards, presenting a startling contrast with those of 1914, have emerged, and must perforce be accepted in the conduct of history to-day, hampered and complicated as it is by so many other factors alien to the conditions that existed seven years ago.

It may be said, too, that the violent disturbances of the international exchanges which have taken place since 1914 (though themselves resulting from new and unprecedented conditions) have introduced a strange and not unimportant complication into the business affairs of this insular country, so vitally dependent as it is upon imports and exports for the healthy and vigorous development of its industrial life, and therefore of national prosperity.

I shall not be expected to examine the many influences which bear upon the problem of the foreign exchanges; but it will be obvious that with the pound sterling worth now about 50 French francs, as compared with a gold parity of 25·22½ francs, and a pre-war rate slightly in excess of that figure, the financial basis upon which our foreign trade is now conducted is very different from that of 1914. Also that while all fluctuations in foreign exchanges are to a great extent reciprocal in their effects, our industrial difficulties cannot be other than aggravated by financial disturbances such as are reflected in the present abnormal rates of international exchange.

REASONABLE CREDIT FACILITIES.

This consideration leads one to the point that, prior to the war, British industry enjoyed the paramount advantage of reasonable and comparatively easy credit facilities—facilities without which the commercial expansion attained by Great Britain in past years could never have been accomplished. Finance is, so to speak, the fuel of industry; and credit restriction—which is one very important manifestation of the changed conditions—while it may interpose a much needed obstacle to reckless speculation, must at the same time retard progress in the case of many soundly conducted enterprises requiring fluid resources for continuity of operations and legitimate expansion.

UNEMPLOYMENT AND SHORTAGE OF LABOUR.

Other features of the pre-war industrial conditions were, I think, the general adequacy of labour for manufacturing needs, its more favourable opportunity for migration, and the fluctuating degrees of unemployment then experienced in different trades. The position in respect of these various matters was profoundly affected by the sufficiency of housing accommodation which existed before the war, just as now the corresponding set of factors is severely aggravated by the serious housing shortage which is rightly given first place among the social problems of to-day.

While, on the one hand, unemployment is again on the increase, yet, on the other, there has now to be faced a serious shortage of certain classes of labour. In the case of other trades, while the labour is remotely available, the (regarded generally) insuperable difficulty—despite the best efforts of the Labour Exchanges—is to transfer that labour to districts where it can be utilized to the best advantage, alike to the individual and to his particular branch of industry. And a further trouble is that some of the labour organizations are averse to the incorporation of men into a trade which they were not previously following; and this action is deterrent to the most profitable utilization of available labour where the supply of work exceeds the supply of men.

CAPITAL AND LABOUR.

I come now to my last, and in many respects most important, comparison—namely, the relations of Capital and Labour in 1914 and at the present time. To many, the relations of Capital and Labour represent the whole of the industrial problem. But this, as I think you will have gleaned, is not by any means my own view; and I do not propose, therefore, to go very deeply into a subject upon which so much has already been said and written. Even prior to the war industrial conditions were profoundly affected by the growing consciousness by Labour of its corporate power on the one hand, and, on the other, by the trade combinations and capital aggregations brought into being very largely to counteract the industrial power of the Trade Unions.

Now, while both sides have made rapid strides during the past few years in the matter of unity, I do not think the present relations of Capital and Labour differ very materially from what they were before the war, nor, indeed, from what they always have been. There has simply been during the war period a more rapid development of the ideals of trade union policy—more rapid than the most sanguine had hoped for; and this has been the opportunity of the extremist element to try to effect more than this democratic country could entertain. A good deal has, however, been done, by the intervention of the State, to bring about a clearer undertanding between these two mutually essential components of industry; and I do not see any necessity to share the pessimism entertained by so many in respect of the future.

It is both right and essential that Labour should combine for the advancement of its own interests, and to overcome the indifference of (shall I say?) the bulk of employers in the past to the welfare of the employed. The twentieth century has seen this indifference greatly on the wane; and the sense of brotherhood which the war produced gave it its death-blow. The working man, however, finds it difficult to believe this, though he cannot but realize that the comprehensive reward of labour is to-day greater than it has ever been before in the history of our consti-

tution. It is, of course, no less desirable that capital should organize—not (and this, I believe, has never been its intention) to oppose the legitimate aspirations of the worker, but certainly to check, if need be, the abuses which history teaches us are incidental to the arbitrary exercise of conscious and unchallenged power.

A little adaptability on both sides to the good points of each would bring about a sympathy between the two. They are indispensable one to the other; and a union of interests would lead, I believe, to great strides in the advancement of industry. But the day has gone by when either party, were it so minded, could do any very great injustice to the other; for in the case of more recent trade disputes we have seen that the compelling force of well-instructed public opinion has held the balance, and largely inspired the settlement. This growing tendency is to my mind, perhaps, the most significant change in the relations of Capital and Labour of the past few years. Time was when trade disputes were of so comparatively sectional a character that the differences were left to the disputants to compose; whereas now the more serious menace to the general welfare which the closer federations of Labour and Capital present has been attended by the compensating advantage that the people as a whole feel their stake in the issue, and have constituted themselves the umpire in any dispute which, if carried to extremes, might conceivably result in public disaster.

I should like here to express my deliberate opinion that the remedy for the discontent which is rife at the moment among so many sections of the community who come under the heading of "Labour" lies entirely in the workman's own hands; and it is work. Take a man's work from him, and, though his livelihood be assured by other means, yet he becomes utterly miserable. Once Labour as a whole realizes the enormous personal benefit to be derived from sheer hard and sustained work—with, of course, sufficient recreation to prevent monotony, and conditions such as to preclude worry—the war between Capital and Labour will be at an end, and discontent will vanish. I do not wish to convey the impression, however, that I regard the British workman in any sense as a slacker. In my opinion, in many cases where output is below the required standard, it is not on the shoulders of the workman that the whole blame should be cast; but it is attributable in very large measure to the inefficient and unwieldy organization of the factory, mine, or whatever the headquarters may be. One is cognizant of organizations, mainly (it must be regretfully admitted) in America, whose conditions may be regarded as ideal, and whose output is phenomenal. This emphasizes my view expressed above—that Capital and Labour must work hand in hand for the common good, and that in unity alone is strength.

I have expressed the view that the relations of Capital and Labour have not materially altered. I would, however, qualify this to the extent of observing that these relations have been modified to some degree by the extension and improvement of popular education. It must be apparent that the instructed mind of the worker to-day approaches an industrial, or indeed any, question in a much more reasonable manner than was the case in less enlightened days; and, in my view, it is altogether contradictory to insist, on the one hand, upon a definite and improved standard of education for the individual, and, on the other, to imagine, or expect, that the higher level of intelligence that must needs result will leave the worker in the old-time state of mental fog in respect of his wider interests.

Of course, the unavoidable necessity for conducting industrial enterprise on strictly economic principles does not permit of Capital conceding to Labour all that the latter may consider itself entitled to. Nevertheless, I am quite satisfied that Capital does appreciate the necessity for giving Labour an increasing share in the fruits of industry, and that every stage in the betterment of the workers' condition has (with very rare, if any, exceptions) been attended by industrial progress in the best sense. It must be emphasized, however, that it is just as essential for the willing spirit to be shown by the worker as by the employer; and it is only by finding common ground that industrial strife will cease. Under existing conditions, the employer must, in making his calculations, be prepared for the possibilities of a strike, and cannot use such a free hand in the matter of wages as if this threat were non-existent. The worker is haunted by the bogey of "over-production." Eliminate the possibility of the strike and the error of the worker, and employer and worker can go ahead unshackled; and the resultant industrial prosperity would be the solution to the problems of unemployment and the high cost of living.

I have the greatest possible confidence in the ultimate sanity of British labour. Despite the extremists in its ranks, and notwithstanding anything that may point to the contrary, I believe that the British worker recognizes the immense stake that he has in assisting the preservation of social order; and I consider that in this recognition he can clasp hands with Capital, which is interested equally with him in resisting revolutionary tendencies. For let it not be forgotten that the present order of things in this country—politically, socially, and industrially—is the evolutionary growth of the ages, and that its foundation is rooted in the traditions of constitutional freedom. Any interference with the solid foundations of so patiently built and complex a structure could only result in a levelling of conditions in the sense that ruin would be general; and I, for one, cannot conceive that the British worker, who did so much in the war to preserve our freedom and institutions, will ever prove so foolish as to sacrifice the solid advantages which he now enjoys in the pursuit of the mirage of a never-attainable millennium. On the contrary, I believe that the British worker, who is a splendid fellow at heart and a pattern for the world, is imbued with sound constitutional instinct, and that, under the direction in many cases of those under whose leadership he fought in the war, and who have now returned to work with him in industry, he will assist this Old Country—which has emerged from the war with incomparable prestige—to attain to heights of industrial greatness unparalleled in the history of the world.

DISCUSSION.

The PRESIDENT (Sir Arthur Duckham) remarked that they would leave the question of thanking Mr. Davis for his excellent paper to later on in the proceedings. The discussion was now open; and he hoped it would be a good one. He would call upon Alderman West to open the discussion.

VALUE OF WORKS COMMITTEES.

Alderman FRED J. WEST said he had been asked to second the vote of thanks to Mr. Davis for his paper; but the vote had not yet been proposed. However, he should like to pay a personal tribute to Mr. Davis for an excellent Chairman's address. He thought the members would all agree with him that it would rank very high among the excellent addresses they had already had from previous Chairmen. Mr. Davis had touched in a very sound and broad way upon the pressing problems of the day from the point of view of the manufacturers; and he (Mr. West) thought he might say that Mr. Davis had approached the many difficult problems they were endeavouring to solve at the present time from the standpoint of (if he might so term it) the new school of thought among employers. On the economic subject of wages and hours, he would like to remind the members that there was an investigation proceeding at the present time with regard to the claim of the engineering unions that hours should be shortened from 47 to 44. On first blush, he thought most employers would be prepared to say that, from the point of view of economic production, this could not be carried out. In his opinion, however, they had to look very closely into the position, and not approach it without having before them facts and figures. He did not want to approach the position just now, because his firm were associated with the investigation, and were to receive a visit from the Investigation Committee. The problem that confronted the Committee was the difficulty of getting reliable information and facts in order to draw up a satisfactory report. It was not sufficient to say that the industry could not afford to reduce hours any further. Decision must be based on solid facts or output per hour per man, and cost per man per hour, having regard to the increases of wages that had taken place during the war period. The most interesting part of the paper, so far as he had read it, was with reference to the question of capital and labour, including the remarks as to unemployment. It was really very difficult, from the general view of the working man, to consider seriously the question of increased output with the fear of unemployment staring him in the face. Employers would be wise if from time to time they took their workpeople into their confidence with regard to the state of the firm from the point of view of contracts and orders on the books. In connection with the works committee, they had for some eighteen months had monthly meetings in the evening after working hours; and he had through these meetings informed the men of the contracts the firm had secured. This had created a good impression. The workmen appreciated the employer taking them into his confidence. He was certain the establishment of works committees in their shops must lead to good results. He would enthusiastically recommend those who had not moved in this direction to establish a works committee, as recommended in the Whitley report. In the case of his own firm, he was satisfied they had through the works committee established between themselves and the workpeople a much better feeling than existed in earlier times. Through these meetings they could discuss many questions affecting the welfare of the men, and such matters as were referred to by Sir Robert Hadfield that morning. There were many questions that could be brought forward by, and be discussed with, the workpeople—ventilation, heating, and systems of payment were some of them. Means of speeding-up the payment of workers was not an unimportant one to the men. In some places they saw them hanging about for some time while the wages were being paid. They had had valuable suggestions from their men as to the manner in which they could speed-up their wage-paying method. They had also had discussions from time to time as to the speeding-up of the cranes. Men complained that they were kept waiting for the lift; and through this reason they were not able to earn the bonus on their day's work. They made suggestions which led to a reorganization of the work; and the arrangements made were also of benefit to the employer. What he felt they were re-establishing in this matter was that individual touch which had largely disappeared, and which ran the risk of disappearing altogether owing to the huge organized bodies of employers and the highly organized unions. In other words, under the establishment of employers' organizations and trade unions working together in groups, there had been the danger of that individual touch between workmen and employers rapidly disappearing. He (Mr. West) looked to the works committees, entered into in the right spirit on both sides, leading to that condition which accounted for a good deal in industrial life. If they were going to bring about this better feeling, it could only be done by the closer contact of the human elements in industry. As employers they would be bringing about a right feeling by consideration of this important point.

A MAGAZINE AND A FULLY LICENSED CANTEEN.

Mr. HAROLD N. DAVIS said he was rather surprised that his worthy brother, having regard to what their own firm was trying to do for the social welfare of their workpeople, had not mentioned this in his paper. Mr. West had alluded to works committees. In their own case, they had had excellent proof of the valuable work the works committees could do in realizing a much better feeling between employer and employed. But their own firm had gone a little bit further

than that. Some few months ago they started a works magazine, called the "Davis Gazette." This magazine was run entirely by the works; and the editor was one of their own employees. It created a very great amount of interest. It was not distributed free to the employees; they had to pay for it. Last month he believed the circulation represented about 75 p.ct. of the employees of the firm. This showed that 75 p.ct. of their employers were sufficiently interested in their community to pay for the monthly "Gazette." He would also like to touch upon the question of social welfare. They had inside the works a beautiful bowling green. Their bowling team won the championship of Bedfordshire last year; and one of their members won the South of England championship this year. On a 10-acre field they had tennis courts, two football pitches, and a hockey pitch for the women employees. A most interesting part of their social welfare (which perhaps some members might not agree with) was a fully-licensed club within their own gates. They had had a club on the works with billiard tables and that sort of thing for a long time. But the billiard club began to waver. He was advised that the only possible way to revive interest was to have a full drink licence. He held his hands up in horror, although not a teetotaler. Considering the matter very closely, they looked at it from a point of view of human nature. If they told a man he must not have something, that was the very thing he wanted. If their men wanted a drink after working hours, the nearest public-house was half-a-mile away. When they had walked that distance specially for a drink, they were not content with one pint. It was agreed they should apply for a full drink licence. This they did, and they had had it some eight or nine months. He could say that it had far exceeded his own or the Directors' expectations. There was far less drinking now than before among the employees. Whereas previously the moulders, for instance, would go some half-mile for a drink, they now put on clean shirts and collars, and came into the clubroom like respectable citizens, and played cards and billiards; and drink became only incidental to their enjoyment. This was a subject he had had near his heart. They had tried to do all they could for the social welfare of their people; and they had proved it paid employers to do this—giving them good clean conditions inside the works, and taking an interest in their working conditions, magazine, and so forth. Such a policy paid employers a hundredfold. If they wanted to get good co-operation and a good spirit, they had to remember that their men were not machines, but human beings like themselves.

For Free Trade.

Mr. SAMUEL CUTLER, JUN., said he should like to record his support to the hearty vote of thanks to be given to Mr. Davis for his excellent paper, which he thought would form a good starting platform for the Quarterly Bulletin which the President had intimated would be published in the future. He should like to emphasize what the President had said, that the Council would look to the support of the whole of the members to make their transactions a success. Many other societies had their own transactions; and he thought it did them a lot of good. It advertised the Society; and it circulated among the ordinary members information of the work the Council were doing. As to the paper, he was heartily in accord with everything the Chairman had said in it, especially with respect to free trade policy, which he (Mr. Cutler) tried to advocate in the autumn of last year. He congratulated their Chairman that he had not Mr. Balfour Browne present that day. [Laughter.] As to the part of the paper which related to private enterprise, he took it that Mr. Davis meant private enterprise other than State controlled, because, as he (Mr. Cutler) endeavoured to point out in his paper last year, it was by individuality that Great Britain occupied the position of holding the foremost place in the world's trade. Supremacy had not been obtained by State control or huge amalgamations and fusions in which individuality became lost. With regard to unrestricted markets, and Mr. Davis's remarks as to cheap commodities and the comparative abundance of raw material, he heartily congratulated him upon the bold statement that he had made as to a free-trade policy. He referred to the long period before the war when they were enjoying the advantages arising out of the then fiscal policy. The supply of cheap materials is what they wanted, and working them up as they did before the war was what they had to do again. The arguments put forward for a free-trade policy perhaps sounded a little bit hollow to-day. But what they had to do was to still wait their time. The present position was due entirely to transitory conditions, and to the rates of exchange that existed between this and foreign countries. The mark before the war was practically equal to a shilling; to-day it was only equal to a penny. Therefore it was that Germany was probably able to compete with this country; but that could be only temporarily. He trusted the Government were not going to give much notice to the deputations which they were receiving, because the people who manufactured magnetos wished to put an embargo upon manufactured materials coming into this country. One point he rather hoped the Chairman would have mentioned. That was the question of E.P.D. He (Mr. Cutler) had tried to translate it into an "Everlasting Plundering Drawback" to industry. Were they going to risk their capital in unfavourable contracts after they had got up to their pre-war standard of profits? Undoubtedly they were all working for the same customers, and buying the same materials. Why should one firm with a more favourable pre-war standard be better off than another firm who had, through fluctuating trade, a low pre-war standard? If they went to the working man (they were all thinking of what the working man thought), was he going to be content with giving up (say) 60 p.ct. of the increase upon his pre-war wages? With regard to shorter working hours, perhaps some of the members had noticed a short paragraph in a daily paper, stating that Mr. Cramp, the Secretary of the National Union of Railwaymen, had issued a notice to every railway employee, stating that he intended to stamp-out the prevailing methods of filling-up leisure hours by the men taking on jobs as gardeners, painters, and musicians. It was not for this that the Union leaders took upon themselves the tremendous trouble of winning shorter hours. What did it mean? That the men were not sufficiently employed. In Germany, they were able to produce more through longer hours; and this country would find the competition of Germany running up against it very shortly. But they believed, as the Chairman had said, that the British working man was an honest man; and it would only be a matter of time before they saw him doing a little bit more. They had waited a pretty long time for this. What were they paying for steel plates? They were paying £28 to £30 per ton, against £7 before. What was the intrinsic value of the steel plate? There was no intrinsic value. It was wholly composed of labour. They were paying war-bonus to-day to the extent of 80 to 90 p.ct.; but this did not represent the difference between £7 and £30. The difference was due to restricted output. They were getting half-a-day's output for two days' pay. This represented four times the increased cost of raw materials compared with what they paid before the war. As to industrial welfare, he (Mr. Cutler) was extremely glad to hear what Mr. Davis and others were doing in this respect. His own confidence, however, was a little shaken in the matter.

More Good Experience of Works Committees.

Mr. F. G. COCKEY said his duty was to propose a vote of thanks to their Chairman for his interesting and valuable address. His proposal had already been seconded by Mr. West, and supported by Mr. Cutler. [Laughter.] It had been most interesting to listen to the paper; and there were many points in it which gave them a good deal of food for thought. He (Mr. Cockey) agreed with both Mr. West and Mr. Davis in regard to the benefits—particularly the improved feelings—that arose from works committees. His own Company had had a works committee going now for some two or three years. It was essentially a welfare committee; but apart from the fact that they brought to notice many little, and some big, points about the works, as to improved comfort and conveniences for the men, the committee did promote a better feeling between the management and the employees. It had brought them into personal touch; and there was a great deal in this. Also, as Mr. West had said, there were many valuable suggestions made which had led to economy in time and general improvements in efficiency. A point about the Works Committee was that the members represented the men personally without any Union limitations about their proceedings. The men through the Committee met the employers entirely apart from their Unions, and matters were discussed across the table in a friendly way. He believed there was now a better feeling altogether. The men began to appreciate that there were more points of view than one. He had gone so far as to take them considerably into his confidence as to the position of the business—the economic position, and the factors which affected them in dealing with questions of wages, hours, and so on. On the whole, the result had been decidedly good. The related questions of increased production and unemployment had cropped-up in their particular industry. A year or so ago they were pressing the men to increase production in every possible way; and so far as he could judge the men met them very well, and did improve output considerably. The men raised the point at the time, as naturally they would, that, if they increased production, the time would come when there would be the necessity for cutting-down production, and probably produce unemployment. What they had anticipated had now occurred. They were obliged to curtail production. Before doing anything, however, they called the Works Committee together, put the position before them, and asked them to make suggestions as to how they should meet the situation. They told the Committee they were anxious not to discharge men; and it was agreed, after consultation, to shorten hours. This had been going on for a few weeks, and it was hoped that conditions would soon arise when they would get back to full working hours again.

Exchange and Business Abroad.

Mr. S. FIELDEN (Messrs. Crossley Bros.) remarked that one of the speakers referred to E.P.D. He wished to refer to another aspect of the question—foreign trade. Most of them were interested not only in home trade, but in foreign trade. This question of exchange was a very serious matter indeed. They had met it in a way by quoting English pounds. Last year he was in Italy for six weeks, in connection with the question of the gasification of Italian lignite. The price of coal imported over there had been tremendous. But they had native resources of lignite—considerable amounts—but it was poor material. There was great scope there for the gasification of lignite. He had offers of orders for upwards of £100,000 if they would accept payment in Italian lire, which were about 43 to 45 to the pound. These contracts would have taken eighteen months. He had often wondered what his position would have been if he had accepted these contracts now that lire were about 90 to the pound. The "Price Adjustment Clause" was a restraint upon foreign trade, but he believed this was going to be very soon settled now. Labour was getting to the point when it recognized that nothing more could be done with respect to increasing prices for foreign trade. If, however, exchange could be stabilized, they could do business even at 90 lire to the pound, if there was not a big drop or corresponding advance. He thought that some pressure should be brought to bear on the Government with regard to their own general expenditure and the control of various industries. In present circumstances, there could be no stability in exchange.

An Interest Beyond Wages.

Mr. THOMAS GLOVER (Messrs. Alder and Mackay) remarked that, after what had already been said, there was little to advance on the general question; but, if he might be allowed to do so, he should like to add his tribute to what had been said before as to the character of the paper the Chairman had given them. Probably he had had the pleasure of personal acquaintance with Mr. Davis as long as anybody in the room. He had known him as a good sportsman, a good friend, and a man possessed of a great fund of wit. That day he had come before them in quite a fresh light—in the light of an earnest thinker. There had been in the discussion references to the personal touch or contact between those who were engaged in running works, and those employed in them. Many of their troubles in the present day were due entirely to the fact that their contact with those they employed was not direct; it was automatic, and perhaps it was over-organized. Mr. Harold Davis had told them of the success he had obtained by running a fully-licensed canteen on the works, and that he had had some eight or nine months' experience of it. He (Mr. Glover) could only say that he had run, or had done so up to a recent date, a

fully-licensed works' canteen for over eighteen years; and all the advantages Mr. Harold Davis had found he could confirm. It was a good thing to give the worker an interest in the factory beyond his wages. That was the real thing; if they could give the men an interest other than wages, things would sooner or later settle down.

A Conscientious Works Committee.

The President, in closing the discussion, said he wished to add a personal word of thanks to Mr. Davis. He had had the privilege of reading the paper before the meeting; and Mr. Davis asked him his opinion as to the contents. His reply was that it was a paper that would give them furiously to think. He (Sir Arthur) asked him what were the solutions. Mr. Davis's answer was that they had to think them out. That was what they had all to do. In the discussion there had been mentioned the question of exchange and world finance. He did not see how they were to get down to a good state of things unless the world's finance was put right. Under the conditions of to-day the basis of industry was export. The condition of things to-day was that one nation was a strong creditor, and another was a strong debtor. Most of the nations were heavy debtors. That was the worst possible position they could have for trade. By far the best policy would be for America to cancel the indebtedness to her of other countries, and for Great Britain to do the same. They would thus stabilize the exchanges, and would gain more than they would lose by cancellation. They would never get the money back; they were not even getting the interest on it. Therefore he believed the strongest world policy would be to get America to cancel the indebtedness to her if this country did the same. That was one of the broad lines of policy that was required to-day. He had been called all sorts of names for advocating this. Another point upon which he wished to touch was the use of the expression "capital and labour." That they talked about "capital and labour" was one of the bases of their troubles to-day. They had the enormous company capital represented as having no personnel, no bowels, no anything; and labour as a poor sweated set. [Laughter.] He therefore thought that "capital and labour" was a wrong expression. They were all employed—all of them were employees, as well as employers; and they wanted to get away from the misconception that hung about the term "capital and labour." He was sure the words were used to the detriment of industry by the extremists on the labour side in a way they should not be. The other point he should like to mention was the matter of works committees. He was interested in a company that had had a works committee since 1914. The committee had rather larger powers than most works committees, in that it had fixed the wages of the workpeople among other matters that were usually dealt with by such committees. It was a chemical company of which he was a Director. In the chemical industry, there was a bad slump all over the world. Nobody was buying chemicals to-day. Not long since the Board received a note from the Committee to say that the scale by which the wages were increased to match the cost of living was too high, and the wages being paid on the works were too high. The Committee followed this up by another note, which said that, owing to the state of trade, they would like to meet the Directors, and have a consultation with them as to the manner in which the wages could be reduced, and put on a better basis, to meet the bad trade. This works committee meeting he had attended last week; and they spent some three hours discussing the question. They eventually decided to reduce the scale of wages throughout the works; the Committee's view being that the increase worked out on the scale of the cost of living gave too high wages. While they were waiting for some figures, the Chairman of the Company asked him to explain to the works committee the wages scheme that he had ventured to put before the Society earlier in the year—that was to have two rates, a subsistence rate which would be variable, and a wages rate which would be permanent. He told them that he did not, however, think the time was ripe for such a big alteration in England. He was rather surprised to receive a letter shortly afterwards saying that, after his remarks, two of the workmen had gone away, and worked out a scheme on these lines; and it had been settled that their works wages should be paid on these lines. He was rather amazed at the men taking it up, and working it through. However, it was important that they should consider that they were employers working with their employees. They were all working together; they were all the servants of one business. The men to whom he had been referring when they got them together had the feeling that they were—employees and themselves—all pulling together. He might say that he had never seen better output than in these works, and in his own Company. He believed every man in these companies earned the wages he received. He would now put the proposal for the vote of thanks to Mr. Davis for his paper.

The vote was carried by acclamation.

Mr. Davis, in reply, said he was glad indeed to feel that his paper had been of some interest to the members; and he was pleased it had drawn such an excellent discussion. It was a subject they were all intensely interested in; and he thought all societies the members of which employed a large number of men would do well to have from time to time papers dealing with labour matters. It had struck him that a great amount of good had come out in the discussion through the opportunity for giving expression to opinions by men who were in the responsible position of employing labour. He very much appreciated the kind remarks of the President and other members, as well as the vote which marked the approval of those present.

Presentation to a Gas Official.—On the 13th inst. a presentation took place to Mr. James Whyte, on the occasion of his retirement from the managership of the Seaham Harbour Gas-Works. The gift, which took the form of an easy chair, was handed over by Mr. Thomas Spencer, the Secretary of the Gas Company, on behalf of the employees; and, asking Mr. Whyte's acceptance of it, he remarked upon the very cordial relations that have always existed between Mr. Whyte and the employees during his long term of forty-seven years as manager.

THE HEATING OF RETORT-SETTINGS.

Presidential Address to the Yorkshire Junior Gas Association.

At a Meeting of the Yorkshire Junior Gas Association last Saturday afternoon—held in the Gas Department Show Rooms of the Bradford Corporation—Mr. G. Dougill (Heckmondwike) gave his Presidential Address. The chair was occupied by Mr. T. M'Nab, of Low Moor (Senior Vice-President).

Mr. Dougill took as his subject

SOME THEORETICAL CONSIDERATIONS IN THE DESIGN OF GAS-WORKS PLANT.

I propose to discuss the design of retort-house plant, with the object of improving conditions where possible, and of combining the best points of various systems. Though it is not usual to discuss a Presidental Address, I hope opportunity will be given either at this meeting or at some future date, as it is only by free discussion that improvement can take place. Even detail improvements in existing plant can be equally important with the design of new plant.

The trend of modern design to date has been in the increase of the temperature of carbonization, though considerable attention is now being given to low-temperature work; and one of the most serious collateral effects of this has been the destructive action of the enormous heats on the retort-setting. I have taken temperatures of 1400° to 1500° C. in the hottest zone of combustion chambers in horizontals, by optical pyrometers which had been very carefully checked. What is the reason for using these temperatures, when it is difficult and expensive to get materials to stand them? Is it not to obtain the rapid and complete carbonization of the coal? I think, on considering the question, that the rapidity of the carbonization is equally important with the completion of the reaction, as the latter could be obtained with much lower combustion chamber temperatures, though, of course, at the expense of speed.

It will usually be found that the hot coke leaves the retort at an average temperature of about 900° C.; and yet combustion chambers in a horizontal setting, to obtain this, will usually be of the order of 1400° C., though in vertical retorts lower temperatures usually obtain—1200° to 1250°. It seems possible that, by analyzing the reasons for this difference of temperature, it might be decreased; and when it is considered that a fire-brick at a temperature close to its softening-point will have a life of a few months, compared with years if 50° to 100° C. below that point, it is obvious that every little will help.

The amount of coal carbonized per day is governed by the rate at which heat can be transmitted through the walls of the retort, provided this is not above the rate at which it can be absorbed by the coal; and the factors governing the former are the temperature difference between the outer and inner surfaces of the retort, the area conducting heat, its thickness, and a factor depending on the material itself. The first of these factors is a very important one, as the amount of heat transmitted varies directly as this difference of temperature—that is, if the difference of temperature be raised from 100° to 200° C., approximately double the amount of heat would be conducted. It is obvious, however, that to increase the heat flow by this means involves either raising the combustion chamber temperature or lowering the temperature inside the retort. As the retort temperature cannot be dropped, the general practice has been to raise the temperature of the combustion chamber till the limits of refractoriness have been reached. My own feeling is that this factor has been used excessively, and that it is desirable to reduce the combustion chamber temperatures, if at all possible, in the interests of long retort life, while still maintaining the retort temperature.

The second factor mentioned—viz., area of conducting surface—does not seem to have been considered quite so keenly, though there are distinct possibilities here. In a horizontal or inclined retort-setting walls and heating spaces alternate of equal (or approximately so) dimensions, leaving about half the retort surface only for direct conduction of heat. The supporting walls absorb heat during the end period of the charge, and give heat to the retort during the beginning of the charge, and so act as heat reservoirs. While this is quite desirable, and helps the charge considerably, it is clear that the heat has to travel a much longer path and across several transverse joints—both conditions which hamper the heat flow. Is not this the reason why a lower combustion chamber temperature in a vertical retort-setting will give an equal retort temperature?

The horizontal supporting walls in a vertical retort-setting can be and are spaced very much further apart, owing to the greater stability of the retort walls by being vertical; and they occupy a much smaller fraction of the retort surface. For instance, in the "Intermittent Verticals" with which I am most acquainted, there are only seven flue walls in a distance of 10 ft. The inside surface area is 72 sq. ft., to which is exposed about 9 cwt. of coal, or 160 sq. ft. per ton carbonized (twelve-hour charges). The external surface is approximately 52 sq. ft., or 72 p.ct. of this. In the horizontal type, the inside area—taking a 24 in. by 18 in. by 20 ft. retort—is 118 sq. ft. for a 16-cwt. charge (also twelve-hour working), giving 150 sq. ft. per ton carbonized, or very nearly equal to the previous example. But in this case the outside area exposed to the heating gases is under 50 p.ct. This appears

to me to be a very serious point, and one well worth considering, as it certainly seems to account for the "high-temperature" results obtained in verticals with moderate combustion-chamber temperatures. I do not know whether this is an inherent advantage of verticals, or whether designers can suggest a method of incorporating it in horizontals.

In a horizontal setting, the combustion chamber temperature of 1400° C. will fall to about 1000° C. when leaving the setting to enter the regenerator. Assuming a temperature inside the retort of 900° C., this will give a difference of 500° C. between the inside and combustion chamber, and only 100° C. between the inside and the flue gases at the outlet. This means that the sides of the retorts near the setting division walls are not utilized to their proper extent in supplying heat to the charge of coal. In the vertical system, combustion takes place at each side of each retort; but in this case the temperature of the flue gases towards the top of the retort falls rapidly. Other factors, however, modify the effect of this. The first is that there is a considerable amount of heat carried up the retort from the bottom to the top by the crude hot gases and steam, and another is the taper of the retort, which causes the charge to be longer at the bottom than the top, and consequently to require more heat.

All these factors have considerable effect on the life of the plant, as its length of life is mainly governed by the life of the hottest spot. I think everyone who has had experience of settings with different-sized combustion chambers will support me in this, as the intense local heats generated in a small combustion chamber cause rapid wear compared with the distributed heat of a large chamber. It seems very peculiar to me that vertical retort settings do not usually have much combustion chamber, but rely on combustion taking place in the flues around the retort. The lower combustion chamber temperatures required certainly do not make a combustion chamber so necessary; but it seems still a desirable feature. If this is not incorporated, a large part of the actual combustion takes place in contact with the retort, and the phenomenon known as "surface" combustion can occur; and the retort is not fitted to withstand the high, but local, heats generated.

Another factor to consider is the thickness through which the heat has to pass. Here very little alteration can be suggested, as mechanical strength is mainly the deciding factor. The horizontal retort working with mechanical charging and discharging machinery must be kept in perfect line, with no sag between the supporting walls; and any reduction in thickness would weaken the retort. The vertical retort here is in a much better position, and thinner retorts are used. In this connection "shielding" must be mentioned, as the shields should really be considered as retort thickness. If shields were not inserted, too much heat would travel through the inner side of the retort; and in consequence of the high temperature generated this wall would be rapidly worn away. It would be considerably better, however, to distribute the heat more, and do without shields; as in this case, with the whole of the retort surface transmitting an equal share of the heat, lower combustion chamber temperatures would be possible.

The other factor mentioned as governing the heat flow is the material; and refractory materials vary considerably in their properties of conduction. Unfortunately, none is at present available at a cheap price. Magnesia which is of good conductivity is basic, whereas coal ash is usually acid, and would consequently flux it. Silica is appreciably better than fire-brick, and has been used to some extent for built-up retorts. No other materials have so far been proposed.

One of the points I wish to emphasize in these remarks is the great difference between temperature and quantity of heat. They can be compared to the pressure and volume of water in hydraulic work, or the voltage and amperage in electricity. The governing factor is the temperature inside the retort. This is maintained by a supply of heat from a source at a higher temperature (the combustion chamber), and provided that no heat was abstracted would gradually rise to the same temperature as the source. But heat is being abstracted from the inner wall by the charge. Therefore the retort temperature is maintained by two flows of heat—one being to the retort, and one away from it. Should one exceed the other, this temperature rises or vice versa; and the function of temperature is to cause heat flow to the charge. If we either decrease the resistance to this flow or increase the area through which flow can take place, we reduce the necessity for very high temperatures.

By visualizing these facts, small alterations may often be incorporated in existing settings—as, for instance, in the spacing of the supporting walls for horizontal retorts it is advantageous, from a heat point of view, to utilize narrow walls and spaces. Mechanical considerations will decide to what extent this can be carried.

Another case in which such considerations can help to decide the type is that of regenerators. A modern tendency in these has been the use of tiles. With them much thinner walls can be obtained, but at the cost of a transverse joint. Any given design, however, can be compared for heat conductivity. Then if this is better than the existing type, similar comparisons of mechanical strength, cost, length of life, &c., will decide whether a change is desirable.

Bearing these considerations in mind, it is interesting to compare a retort-setting with a coke-oven, and see the methods adopted by a different industry. The majority of English coke-ovens are of 8 to 10 tons capacity, worked off in 18 to 30 hours; whereas a retort-setting of 8 to 20 ft. retorts will carbonize about 12 tons in 24 hours, and an "intermittent vertical" about 16 tons per setting in 24 hours. So that the units are approximately comparable. Half of each side is heated by rows of burners. The products of combustion rise through vertical flues to the top of the oven, and down similar flues in the other half of the oven to the recuperators (except in the case of waste-heat ovens). Here the products pass through chequerwork to the stack. At the end of a suitable time, the flow is reversed. Heat is abstracted from the recuperators by the incoming air, and the products of combustion pass out through a recuperator in the other end of the oven. In some cases this change-over is mechanically performed, and is quite reliable.

In these circumstances both sides of the oven are equally heated, and the temperature falls towards the top of the retort where the charge is narrower, as in the case of the vertical retorts already mentioned. The parts of the oven subjected to the highest flame temperatures are alternately subjected to the lower temperatures of the downward flowing products during the change-over; so that all parts of the oven wall are doing an equal share of work. Each gas-burner, however, has a small separate flue, and the vertical walls from these reduce the effective area (for direct heat transmission) very considerably. The oven walls also are thicker, which adds more resistance to heat flow. In the Coking Section of the "Gas World" for Sept. 4 last, a new arrangement of coke-oven flues is described by the Koppers Company, which removed one of the above drawbacks. In this case the flues are triangular. The increased area of wall through which direct heat transmission can take place amounts to 22 p.ct.; and it is stated that the triangular section of the wall gives greater strength. This system has been on trial two years; and it is said that the same throughput of coke can be obtained with 100° Fahr. drop in the temperature. This is an extremely important result, when it is obtained, as in this case, at the same cost and with greater mechanical strength.

Summarizing these conclusions, I think that the vertical retort lends itself most readily to efficient heating, while the horizontal retort is most difficult, and that the coke-oven occupies an intermediate position. In new horizontal plants where outside producers are installed, it seems a feasible proposition to follow coke-oven practice—that is, build the retorts in vertical lines, and have combustion chambers at each side of each retort, with recuperators and a change-over. Opportunities for such radical changes in design do not often occur. Many retort-settings, however, are not perfect in detail; and it is the main object of this paper to draw attention to the possibilities of minor alterations which, by facilitating the heat flow, help to obtain the same results with lower flue temperatures, and thus aid to long life. When considering departures in existing settings, all factors must be borne in mind, and due weight be given to each, as it is no use having a retort with ideal temperature conditions but little mechanical strength or accessibility. The ease with which repairs can be carried out is also an important point; and last, but not least, there is price. Only a compromise of all factors can ensure full efficiency.

DISCUSSION.

The CHAIRMAN, in inviting discussion, said it was a highly scientific and technical paper.

Mr. R. N. WEBB (Leeds) remarked that there was always something new to be found in investigation into the heating of retort-settings. He (the speaker) had himself been fortunate—or should he say unfortunate?—in that, during the whole of his career at the New Wortley works at Leeds, they had built, tested, and worked their own settings of all descriptions, with the exception of the original building of the horizontal settings, and these had been largely reconstructed. With bricklayers' and labourers' wages as they were to-day, it was up to gas managers to prevent all reconstruction work they possibly could; and it was by papers such as this that they learned many little things that would help them to do so without so much labour cost as hitherto. In his own experience, the trouble with retort-settings had been not so much with the combustion chamber itself as with the bodies. He had found that silica goods would last two retort bodies out. This might be due to the fact of the amount of heat which they had to get into the combustion chambers to carbonize the coal in the allotted time. In large works, in particular, they were bound to set a definite time, for the reason that the men had to work to a time-table, otherwise there would be chaos throughout the retort-house. In obtaining the heat necessary to carbonize a given quantity of coal in a given time, they had always to allow for the varying qualities of coal furnished. If a retort-setting could be supplied with one regular quality, it would not be difficult to fix the amount of heat and the temperature required to carbonize efficiently and make the setting last much longer. In his opinion, one really bad feature was the up-and-down temperature, which fire-clay and silica would not stand. If they could maintain one constant heat, they could make the settings last very much longer. The temperatures generally employed at his works ranged from about 1290° to 1350° C. He did not know they had ever got nearer than this to Mr. Dougill's 1400°. To his mind, it would be dangerous to run more than that. He thought it was possible to carbonize a fair quantity of coal with this temperature; but it did depend largely on the design of the setting. He had had rather bitter experience with small combustion chambers, designed to strengthen the setting, though they turned out really to be the greatest weakness. A large combustion chamber made a repair easier to get at, and did away with much of the surface combustion which they had with small combustion chambers. Mr. Dougill mentioned the division of the spaces and the walls. Two years ago he (Mr. Webb) was required to design a retort-setting which he had hoped—and, as a matter of fact, he still

hoped—to erect, a setting of ten retorts in five tiers of two. In this particular setting he proposed that the spacing and walls should be altered. It was designed both with the idea of better heating and greater mechanical strength. The walls were to be made 6½ in. or 7 in. thick, instead of 9 in., and equal spacing. He thought this would be perfectly stable, and would strengthen the body of the retort, because the supports would come more frequently, though they would not be so thick. By a retort-setting of this description, without any other alteration, he thought they could reduce the temperature, and still get the necessary heat temperature through. By doing so, the life of the setting would undoubtedly be lengthened considerably. In his own case the walls covering the inclined joints were 18 in. thick; and they had two walls so thick. The inclined retorts were divided into three distinct portions. They had three separate combustion chambers, and six controlling dampers; so that they could get heat from the bottom, the middle, or the top. He regretted to have to say that in most vertical retort installations the manager who was left with the horizontals found that, much to his cost, he was getting the whole of the worst of the coals, and the best were being sent to the verticals. This was a fact which did not give the horizontals a fair chance in any comparison with verticals. He was told that the intermittent vertical could not carbonize slack with any degree of comparison in cost that it could carbonize best quality coal. Directly the worst coals got into the retort, they had to increase the heating, with the result that the body of the retort suffered. The length of life of the verticals at Leeds, for instance, had not been so long as that of the inclined retorts at Wortley. This matter of quality of coal was a most important point, which must not be overlooked when horizontals were being compared with verticals. He fully agreed with Mr. Dougill that it was possible to adopt, even in the present-day beds, the reversal of the heat flows similar to that in coke-ovens. It was worth anybody's time to design a plant with this in view. He thought it could be done without outside producers; but the subject of the latter was very fascinating, and it was undoubtedly the best method of heating retort-settings. In the outside producers they could always get a supply of constant producer gas, and therefore the settings could be kept at a more equable temperature than with the single producer.

Mr. DOUGILL said, on the point of the temperature of 1400° C., this had been taken in vertical silica retorts. The pyrometer was as reliable as it could be; but he had not had all the facilities he would have liked. The matter of trying to get the same heat flow in verticals as in horizontals, only actual practice could really decide.

Mr. J. W. LEE (Chesterfield) thought the address, in its broad survey of the question of the heating of retorts and ovens, was in the right direction. He was glad the President had recognized that, in dealing with the question of coal carbonization, not merely horizontal and vertical practice in gas-works must be taken under review, but coking practice also. It would be of great interest to himself, as a coke-oven manager, to see the setting of retorts which was going to copy the coke-oven intermittent heating; and if such a setting were attempted he would be very glad indeed to render any possible assistance in his power. Mr. Dougill headed his paper "Some Theoretical Considerations;" but he (Mr. Lee) thought that they had listened to a very practical address on a very important question. He believed the day was not far distant when they in England would adopt the silica retort for gas-works, because of its very great advantage in the rate of flow of the heat from the producer to the charge. Most of the coke-oven managers were finding their way to the United States to study the American practice, where the burning time was stated to be about 16 hours. This was not common practice in England. In his own district in Derbyshire 30 and 35 hours were more common. The shorter time in America was mainly due to the fact that there (while they were certainly carbonizing rather smaller quantities of coal) they were carbonizing in silica retorts, owing to its greater conductivity, which allowed the heat to pass much more quickly to the coal.

Mr. C. R. INGHAM (Wakefield) remarked that the trend of the paper seemed to be with regard to getting the carbonization of coal equal to high-temperature carbonization by means of a lower carbonization temperature. It occurred to him that it might be equally advisable to alter the section of the retort. In coke-oven practice, a very narrow section was used. For the same quantity of coal a circular form offered the least circumference; so that with a narrow section they got a larger area for heat transmission. This seemed to be sound theoretically; but he admitted that he was not clear as to whether it could be adopted in practice.

Mr. H. PICKLES (Keighley) said the argument of the paper, apparently, was that the ratio of the heating space to the weight of the charge should be increased; whereas by increasing the cross-sectional of the ⌂ retort they reduced this ratio. There had been a big tendency latterly to go in for larger sections of retorts, and this seemed to him to be going against the principles put forward by the President.

Mr. DOUGILL, in reply, said he was aiming really at lowering the temperature of the combustion chamber, but keeping the true temperature of carbonization in the retort the same. As regarded the round retort and the square retort, he thought they would find this tendency was embodied in the newer settings. As to a smaller retort, if they carried this to extremes, they came up against other difficulties. They obtained the rapidity of carbonization, but they had the gas exposed to a very high temperature; and this was the opposite of what they were aiming at. If they took a larger retort they had a compromise of a retort with a fair heating surface with a fair quantity of coal, but not overheating of the gas. They had to forego area for some other consideration. As a matter of fact, one found in nearly all problems that the best result was a compromise of all the factors.

On the proposition of Mr. E. A. LEASK (Leeds), seconded by Mr. S. H. PACKER (Bradford), the President was heartily thanked for his address.

The Manchester and District Junior Gas Association are to visit the City Justices' gas-meter testing-station, in London Road, Manchester, on Saturday, Dec. 4, on which occasion Mr. A. B. Small, of Liverpool, will read a paper on the "Training of Gas-Works Chemists."

MIDLAND JUNIOR GAS ASSOCIATION.

Visit to the Windsor Street Gas-Works, Birmingham.

On Saturday last, the members of the Midland Junior Gas Association paid a visit to the Windsor Street Gas-Works of the Corporation of Birmingham. A hearty welcome was accorded to the party by Mr. G. C. Pearson, the Engineer of the works.

Arrangements were made for members interested in distribution matters to inspect the Meter and Stove Repairing and Heat Treatment Shops; while those connected with the engineering side were conducted round the works.

Inspection was made of various washers of the vertical type, including those of Kirkham and Hilton-Willis. Particular attention was given to the exhauster-house, in which were found turbo-exhausters installed by the British Thomson Houston Company—one of them dealing with 750,000 c.ft. of gas an hour, while others had an hourly capacity of 500,000 c.ft.

A 40-K.W. set, 440 volts, 25 cycles alternating current, driven by Curtis turbine generators, was next inspected. This installation supplies the whole of the electricity required on the works. A duplicate set is being put in as a safeguard against breakdowns. There are also in this building three Bellis and Morcom compressors for supplying high-pressure gas to Birmingham.

The purifier-house was next visited, where purifiers of the ordinary water-lute and luteless type were seen. A point of particular interest, however, was the electric telpher used for handling the oxide.

The retort-house, in turn, afforded much food for thought, with its various installations of verticals installed by the Woodall-Duckham Company. Here were seen retorts of a capacity of 5 and 7 tons of coal per diem. The total capacity of these installations is 16 million c.ft. per week. The utilization of waste-heat products by means of waste-heat boilers for steam-raising purposes was an item of especial note. Attention was also called to the method adopted for expeditiously removing coke from the retort-house. This is accomplished by 3-ton skips working on a travelling crane from the retort-house to the screening plant. An additional 10-ton travelling crane is used as a stand-by. It was pointed out that in a works of the size of Windsor Street, where upwards of 1000 tons of coke per day was being dealt with, it was impossible for this to be done except by the use of up-to-date machinery. The members were shown the method of unloading coal from wagons by means of a "Tippler." The whole of the coal-handling plant was installed by Messrs. Babcock and Wilcox, and is said to be highly efficient.

The party then passed on to the water-gas plant and saw the Humphreys and Glasgow installation. Here again it was mentioned that considerable economy was being effected by utilizing the blast, when possible, for raising steam for the water-gas boilers. With the present price of gas oil, it is not a paying proposition to make water gas.

The meter and stove-repair shops, which are under the control of Mr. R. J. Rogers, were next inspected, and opportunity was afforded the members of obtaining an insight into the methods adopted for executing repairs to all sizes of wet meters. They were seen in various stages of repair. In these shops, meters up to 5-light are made, while parts required for meters to 1000-light are dealt with. The lay-out of the shop was of extreme interest. The work undertaken in this section also comprises the making and repairing of calorimeters, test meters, governor bells and floats, exhauster bells and floats, test-holder bells, all sizes of wet meter drums, and sheet metal requirements for gas-works. Repairs are also effected to pressure registers, rotary station meters, and wet station meters. In connection with dry meters, the members were shown several in working. An explanation was given as to the method adopted of fitting and testing the diaphragms.

The stove repair shop (cooker section) was then visited. In this section cookers requiring repair are brought from consumers' premises and, wherever possible, are either repaired or renovated. Other work performed in this shop comprises the making of wrought-iron ring and poker burners for old-pattern cookers, making short pieces from scrap tube, cleaning and repairing old valves, shortening pendant rods, polishing and general brazing, general repair and renovation of gas-heated wash-boilers.

In the heating stove section the work undertaken includes the renovation and repair of gas fires and radiators. The process consists in dismantling the fire completely; and if it is in a very bad condition, the casting is suspended in a hot solution of caustic soda. The caustic soda is washed off and the casting scraped, brushed, and thoroughly rubbed with emery cloth. It is then painted and stoved. The brasswork is cleaned and polished; cocks are fitted and tested. A final test is then made.

The heat treatment shops, supervised by Dr. C. M. Walter, were then inspected. After this the party adjourned to the staff mess room, where tea had been provided by the Birmingham Gas Committee.

The PRESIDENT (Mr. W. J. Pickering), in thanking the Gas Committee for their kindness in granting the necessary permission to visit the works and for the hospitality exhibited, also expressed thanks to Mr. G. C. Pearson for receiving the party and conducting them round the works. As a Past-President, Mr. Pearson had done much spade work in the interests of the Midland Junior Gas Association. He was

to be congratulated on the condition of his works. The President further expressed his appreciation of the arrangements made by Mr. R. J. Rogers (also a former President of the Association) and by Dr. C. M. Walter for inspecting the meter and repair shop and heat treatment shops. He accorded a hearty vote of thanks to the Gas Committee and all who had assisted in making the visit such an instructive and enjoyable one.

The HON. SECRETARY (Mr. B. J. Bell), in seconding the vote of thanks, expressed his high appreciation of all that had been done to make the visit such a great success.

Mr. PEARSON, in replying, thanked the members for the expressions of appreciation extended to himself and members of his staff who had rendered assistance. He remarked how gratifying it was to see such a large attendance. At Windsor Street they carbonized up to 1200 tons of coal per day, and could make 16 million cubic feet of gas per week. This, by means of steaming, could be increased to 18 millions. The coke plant was dealing with something like 40 tons per hour. He did not consider vertical plants were difficult to work, and remarked that flexibility of coal-gas plant was an important matter. At the present time they were making about 14,000 c.ft. to the ton suitable for the town. By using waste-heat boilers they were making 19,000 lbs. of steam per hour; and further extensions in this direction were contemplated.

Mr. ROGERS, replying on behalf of the staff of the meter and stove repair shop, said it had been a great pleasure to do anything towards making the visit a success. The fact that it had been possible to cater for both works and distribution members had made the visit the more enjoyable and instructive.

HAMBURG GAS-PURIFIER INSTALLATION.

The "Technical Review," quoting from Director Krause in the "Journal für Gasbeleuchtung," says that the Grasbrook gas-works in Hamburg have been rebuilt for a daily production of 21,500,000 c.ft., compared with 5,000,000 c.ft. from the old works. The available site was 12·4 acres, of which 1·4 acres were required for a retort-house and a water-gas installation. The gasholder for the proposed annual output of 4,600,000,000 c.ft., together with a considerable area for the storing of coal and coke, left very little room for the purifiers; and a four-storied reinforced concrete building was constructed for them, in order to economize floor-space.

There will be in all five groups of purifiers, each for a daily volume of 5,300,000 c.ft., and each occupying a floor-space of 177 ft. by 105 ft. 6 in., or, approximately, 18,600 sq. ft. Two have been in use since November, 1919. Each group of purifiers consists of four interconnected rectangular boxes 21 ft. 8 in. square by 13 ft. 9 in. high, with arched covers and water-seal 31 in. deep. Each box has a volume of 4600 c.ft., and contains six trays with "Lux" purifying material 22⅞ in. deep. One cubic foot of this material purifies 100,000 c.ft. of gas in 10½ months, at the end of which period it contains 48·7 p.ct. of sulphur, and 2 p.ct. of moisture, and needs changing. The removal of the material requires twelve men, the re-filling nine men, per box; the whole being completed in sixteen hours, without creating any nuisance. The spent material may be freed from the sulphur and used again. The gas is then carefully mixed with 2 p.ct. of air by means of a blower, with regulator and air-meter, and is passed through a cyanide scrubber.

The installation has been found entirely satisfactory in working—including the water-seals on the purifiers, which it is not intended to replace with dry packing material in view of the fact that the water-seals act as safety-valves should an explosion occur in the boxes. It has been observed that the depth of the "Lux" material on the trays may be increased from 22⅞ in. to 3 ft. 3 in., without causing excessive resistance to the flow of gas.

Cleaning Chequer Bricks.

Some time ago, the Society of Gas Engineering, of New York, carried out a series of tests for the purpose of determining which was the most economical method of cleaning used chequer bricks. Two mechanical methods—a rotary scraper and a pneumatic hammer—were compared with hand cleaning. The rotary scraper was not a success. As to the other method, the Committee came to the conclusion that, where chequer bricks were badly carbonized, the air or the electric hammer could be used to advantage; but when the bricks were only slightly encrusted they could be cleaned more economically by hand. Superheater bricks were rarely more than dusty; and hand labour was undoubtedly quicker and cheaper than the other methods tested for cleaning these bricks. The publication of the account of these tests led Mr. W. J. Hawthorn to communicate to the "American Gas Association Monthly" the results of an experiment at the Astoria Works. After a run of several hours, it was found that a pneumatic hammer, designed for rivetting and cutting purposes, and equipped with a chisel having a 2-in. face, cleaned about 7 p.ct. more brick than could be done by hand. However, chequer bricks with slight or soft deposits, mostly dust, can be cleaned more economically by hand.

To-morrow (Thursday) a paper by Mr. W. J. Rees, on Fire-Clay Refractories, will be read before the Birmingham Metallurgical Society, at their meeting at the Chamber of Commerce, Birmingham.

WOODALL-DUCKHAM VERTICALS AT INVERNESS.

Inspection by the Town Council.

There was recently an inspection by the members of the Inverness Town Council of the new installation of vertical retorts, the operation of which was fully explained by the Gas Manager (Mr. A. Thomson). The work, estimated to cost £23,500, has been carried out by the Woodall-Duckham Company, Ltd., whose representative (Mr. Maurice Wadsworth) was present at the inspection.

Provost MACDONALD, speaking after tea, remarked that what they had just seen reflected the highest credit on the contractors. They had made a careful inspection; and everyone would agree that it was a very creditable piece of work. Mr. Thomson had informed him that the saving in coals alone would be £4000, and in wages £2500. Besides this, they would be able to increase the production of gas. These facts surely warranted them in going in for the installation of vertical retorts. Mr. Thomson had taken great pains to see the work carried out, and deserved praise for what he had done. Bailie Petrie, as Convener of the Gas Committee, had also taken great interest in the work; and it was only right that the other members of the Council should congratulate the Convener on the completion of the undertaking. He had pleasure in asking them to wish prosperity to the excellent firm of contractors—one of the most eminent in their line in this country—who had carried out the work. To show the amount of work the firm had in hand, he mentioned that they had no less than 35 new contracts. For the manner in which they had carried out the installation at the Inverness Gas-Works, the firm deserved the greatest credit.

Bailie PETRIE corroborated what Provost Macdonald had said as to the excellent way in which the contractors had executed the work. They began to make gas with these retorts on Aug. 31; and the Council were able to estimate for a considerable saving, and to reduce the price of gas as from May 15.

Mr. MAURICE WADSWORTH said it gratified him to hear what had been spoken about the firm, who had made their best endeavours to have a thorough job. He assured them that he had every possible assistance from Mr. Thomson and his staff. It was a great pleasure to him and to the firm that the Corporation, now they had seen the retorts at work, were so well pleased with the installation.

Mr. THOMSON said he was glad to see the installation finished. They could not possibly have had a better firm to undertake it than the Woodall-Duckham Company, who had made a splendid job.

Bailie W. G. MACKAY said they should accord their thanks to Mr. Thomson, their Manager, for the pleasant surprise he had given them after the inspection. It was a great satisfaction to him that the Town Council had adopted this system. Now the Corporation were in a position to give the public of Inverness good value for their money. It was a remarkable thing that the resolution of the Council to instal vertical retorts only passed by a majority of one. He was sure those in the minority would be surprised at the result of the installation, and that no member would have cause to regret the introduction of the retorts.

SOME INDUSTRIAL USES OF GAS.

POINTS FROM AMERICAN GAS ASSOCIATION PAPERS.

During the present week, the Annual Convention of the American Gas Association is taking place in the Hotel Pennsylvania, New York City, under the Presidency of Mr. George B. Cortelyou; and on this occasion the procedure followed has been to publish papers and reports in the technical press as soon as they were available, in advance of the meeting. In this way, a number of the communications to be submitted have already reached us. From some of these the following points have been taken.

The Reynolds Submersible Burner.

The Reynolds submersible pressure-blast gas-burner has been designed to meet a need frequently experienced for internally heated elements. Where gas-burners are used under a metal tank the heat losses are considerable—particularly when the tank contains such substances as would form a sediment at the bottom. The Reynolds burner being submerged in and surrounded by the fluid to be heated, a very high efficiency naturally results; while the purchasing cost of the necessary equipment is said to be approximately 60 p.ct. less than that of a steam-boiler, and the installation cost about 50 p.ct. less. Particulars are given of a number of cases in which the burner is giving complete satisfaction. Mr. James F. Reynolds, of the Consolidated Gas Company of New York, states in his report that comparative tests have been made with tanks in use at their meter and stove repair shops. At 135°, the efficiency was 65 p.ct.; and at this figure of efficiency, there would be required to heat a 900-gallon tank approximately 2600 c.ft. of gas. A test of burner capacity showed that with air at 1 to 2 lbs. pressure and gas at 3 in. pressure, it is possible to burn with perfect combustion 150 c.ft. of gas per hour per burner inside a 3 in. pipe. This gas consumption could have been indefinitely increased, still providing perfect combustion. The number and size of burners installed in a tank depends upon the required speed of heating, and the contents of the tank. The burners are used extensively throughout the city in revolving cylinders and drums that were formerly heated by steam.

A pipe of a size depending upon the number of tips to be used

is drilled and tapped in single or double rows to take the tips, spaced according to the amount of gas required to be consumed. The secondary air-jacket consists of a pipe about two sizes larger than the burner pipe, drilled so that the tips project through these holes which are a trifle larger than the outside dimensions of the tip. The mixing throat is always at least 18 in. long from the tank side of the mixer casting to the first tip. The mixer casting is designed to take the place of ordinary fittings. Primary air and gas are admitted through their respective pipes, and mixed by means of an injector. The air-gas mixture then passes into the burner manifold, and combustion takes place from the small burner-tips. A supply of secondary air to support combustion passes through the air-jacket surrounding the burner manifold, and finds its outlet through a secondary air collar, where the tips protrude through the air-jacket. To permit of the submerging of the burner, a "housing" is provided in which combustion takes place, and through which the flue gases pass until exhausted. There is a hinged cap for lighting the burner. The "housing" is secured to the tank by means of flanges and lock-nuts, thus making a leak-proof joint.

Use of Gas in Automobile Shops.

Mr. Harry L. Wolfe, of the Rockford Gas Light and Coke Company, says gas men are generally familiar with the scientific manner of heat treating automobile parts, and the many other uses to which gas is put in producing the finished article, as well as with the important part played by gas in the subsequent repairing of machines. What the Committee wished to do was to outline briefly a few of the uses to which gas may be put in the public garages and automobile repair shops, in order that gas men in the smaller places may become conversant with the possibilities. Among the many operations now performed by gas as a heating agent in the garage and repair shop are bending, welding, brazing, lead burning, vulcanizing, japanning, hot caustic solution tanks, &c. When repainting, the hood, fenders, running board, and other parts are given coatings of japan; the wheels being sprayed with white or cream enamel, and baked at about 140° Fahr. Extreme care is necessary in baking white enamel; and this is where the gas-heated oven for japanning demonstrates its superiority, owing to ease of control of burners and draught. Such extreme care is not necessary in baking the black japan on the other metal parts in the same oven; the temperature generally being about 450° to 500° Fahr. The danger of explosion is hardly worthy of consideration; but it is good practice to have the top vents open into the flue at all times, except when the baking is approaching completion. It is advisable to keep these vents open, after the oven is loaded and the gas lighted, for about 45 minutes, or until all the volatile oils or the explosive vapours generated have passed from the oven. Controlling levers connected with the shut-offs in the vent-pipes should extend to the front of the oven within easy reach of the operator, and be bent in such a manner that positive knowledge is had of the position of the internal damper. Dust is the greatest enemy to proper work; and so great care must be taken that no down-draught or back-draught is in the oven at any time.

Gas in Railway Shops.

Mr. Roy G. Monroe states that the Denver Gas and Electric Light Company began an aggressive bid for railroad shop gas business many years ago. In 1905 the Colorado and Southern Railroad adopted it for various purposes; and this year the Company's monthly gas sales for that railroad shop are between 2½ and 3 million c.ft. It seems that here the expanding of locomotive driver tyres is the use for gas which makes the strongest appeal to the shop superintendent. It was formerly necessary to heat these tyres over wood or forge fires while lying on their sides. Later on, burners were devised for using gasoline and other liquid fuels; but this plan had many disadvantages which are absent in the case of gas. Now the tyres are removed and set with the driver wheels still on the axle. In setting the tyre, it is first chained over the wheel at the top; and the gas-burner is then fitted around the circumference, and the gas lighted. As soon as the heat has produced the necessary expansion, the tyre is driven on at the bottom with the least practicable expansion, resulting in a minimum of labour and fuel costs. In the tinning and babbitt shops, gas will save labour, fuel-storage space, fire risk, and burned metal and spoilage due to pouring at unsuitable heats; besides this, it makes instant service possible on journal bearings by holding the babbitt ready for pouring at the minimum of fuel consumption and of metal oxidation. The Company have endeavoured to equip these babbitt furnaces with thermostatic control; but gas hand-control is found perfectly satisfactory. There are a number of furnaces in use in the brass foundry. Over 90 p.ct. of the metal poured is red brass; there being between 250,000 and 300,000 lbs. melted per month. The gas consumption averages about 660 c.ft. per 100 lbs. of metal.

Gas for Varnish Boiling.

Mr. Paul Dorchester, of the Surface Combustion Company of New York, is contributing a paper dealing with the two general types of gas-burner application to fit fires for varnish boiling—under-firing burners and side-firing burners. As to the latter, he says burners are installed in the side walls of the fire-pit, so that the flames are directed inward and downward, impinging on the broken refractory material with which the fire-pit is filled. The burners are thoroughly protected from the intense heat of the combustion chamber by the brickwork of the side walls in which they are set. The flames do not impinge on the kettle bottom, but on the broken refractory bed, which becomes incandescent immediately in front of each burner as soon as the burners are lighted. The burners round the walls are on one bent pipe manifold, which is supplied with a suitable air-gas mixture from a single control located at a convenient point. The incandescent spots in front of each burner rapidly increase in diameter until the entire refractory bed under the kettle is incandescent. By transforming, in this way, the heat of combustion into radiant heat—the most efficient means of heat transfer known—this type of burner is able to give the varnish maker entire satisfaction, both in fuel economy and speed of production. Mr. Dorchester has seen such a burner operate for three years without any repair whatever; and during this time it was forced at high speed for seven hours almost every working day. Two or three times as much fast "cooking" can be done with this fire as with the average coke-fire. The disadvantages are the expense and difficulty of installing; for it means tearing down and rebuilding the entire fire-pit. The author declares, however, that the performance of the burner warrants this extra expense and trouble. In the cases of two installations he quotes, the users have found city gas of 625 B.Th.U. at 80 c. per 1000 c.ft. more economical than coke.

Asphalt Melting by Gas.

There are three fuels in general use for the melting and heating of asphalt—coal, oil, and gas. It was pointed out by Mr. C. H. Kallstedt, of the People's Gas Company of Chicago, that asphalt possesses several characteristics which cause difficulty when an attempt is made to heat it. Coal is the most difficult of the three fuels to control; and perfect temperature control is absolutely essential if maximum production is to be obtained. A gas-fire is superior to an oil-fire in this respect. The actual difference in the price of fuel does not enter largely into the question. Coal and oil prices are steadily increasing, and are at no time stable or permanent. Gas will be found much more uniform in price; and assuming that gas rates do increase, the increase will not be in proportion to that of other fuels. In the Chicago district, there are eleven asphalt roofing concerns. At present four of them have contracted for gas, with a total consumption of 10½ million c.ft. per month. The author calculates that 50 million c.ft. of gas per month should be approximately saleable to this class of business alone. With careful study of conditions and methods employed, gas would unquestionably meet with complete success in a plant of this type; and a factory of this character is a very desirable one for a gas company to have as a consumer. One thing for the prospective consumer to bear in mind, however, is that he must not compare the cost of gas with that of other fuels upon a B.Th.U. basis. The numerous other factors which enter into the final cost are essentials which must not be overlooked—such as temperature control, decreased fire risk, cleanliness, space saving, time saving, labour saving, and many other matters. All these considerations make gas more economical than other fuels.

Leaks in Gasholder Tanks.

An American Gas Association Committee, in the course of a report, say that brick gasholder tanks sometimes develop cracks from settlement. These cracks usually occur diagonally, and allow the contents of the tank to leak-out. They can be temporarily repaired by drilling 2-in. holes, and pouring in plastic cement. These holes should be not more than 18 in. apart when the crack runs on an angle away from the vertical line. If the crack runs nearer to a horizontal line, more holes are necessary. This is owing to the fact that the plastic cement will not flow uphill, even under a head due to the material being at a higher level in the 2-in. holes drilled. The material will work its way into the cracks and harden, thereby stopping the leaks. This treatment will have to be repeated every summer, as warm weather softens the plastic cement, causing it gradually to seep out from the cracks. It is pointed out that this method is only applicable to holder tanks which develop cracks in the sides. Where the cracks are on the bottom of the tank, it will be necessary to put the holder out of commission, and empty the tank.

The Coalometer.—The "Iron Age" describes an instrument designed, according to a summary in the "Technical Review," to indicate the conditions below the surface of a stack of coal, so that a saving may be made by the rapid use of any part of it which shows a tendency to become heated. The instrument consists of a set of temperature indicators encased in a long pointed steel tube, carrying at varying depths metal bulbs corresponding to the bulbs of thermometers; and at its upper end a set of dials and pointers indicating the temperature of the bulbs which actuate them. These units are forced down into the coal-stack to definite depths and at various points, and collectively furnish data as to the exact temperatures existing beneath the surface. It is explained that an installation of one unit each 50 ft. in both directions from its neighbour, will efficiently indicate the sub-surface temperature; and therefore one triple unit will protect approximately 900 tons of coal, if the volume is about 50 ft. by 50 ft. by 16 ft.

INFLUENCE OF GASES ON HIGH-GRADE BRASS.

A paper read before the Institute of Metals, by Messrs. B. T. G. Bamford and D. E. Ballard, pointed out that, when melting brass in ordinary fuel furnaces, the metal comes into contact with divers gases; and their effect on the metal and the quality of the castings have been studied by the authors. The following abstract of the paper has appeared in the "Technical Review."

The tendency of gases towards absorption was determined by gradually heating a small sample of brass in a comparatively large volume of each gas, and noting the pressure changes. The rate of chemical reaction was measured by maintaining constant gaseous pressure above a sample for a considerable time at selected temperatures, and measuring directly the volume of gas absorbed. An entirely new apparatus was designed with which to study the solubility of gases in brass. The novel feature was that determinations were made at atmospheric pressure. External variation of pressure during any experiment was guarded against by means of a compensating bulb. Large casting experiments were carried out to determine under what thermal conditions of casting the porosity due to gases could be eliminated.

Briefly summarized, the results of the experiments have established these facts: Sulphur dioxide reacts with high-grade brass at all temperatures between 700° and 1100° C., at atmospheric pressure. The rate of reaction is rapid between 800° and 1100°; but above this temperature there appears to be a reversal. Hydrogen is soluble in 70: 30 brass in large quantities; the quantity absorbed increasing steadily with rise in temperature. Large quantities of the gas may be removed by heating the solid metal in such gases as carbon dioxide or air. Hydrogen dissolves in zinc in small quantities; and the solubility decreases with the rise of temperatures.

Provided the pouring temperature is maintained as high as 200° C. or above, the porosity due to gases is absent. A higher temperature is needed for tube casting than for solid billets of similar weight. Incidentally, it was shown that, where unsoundness exists, it is more generally confined to the top of the casting; and, further, as a comparative test, it is immaterial in which part of a tube or billet a test-piece is taken, provided a uniform system is adopted throughout.

CALORIFIC STANDARD REDUCED AT SEATTLE.

In America another State Utility Commission have recognized the need, under existing conditions, of lowering the calorific standard of gas supplied. The Seattle Lighting Company have been granted a thirty-day experimental period, during which the gas may be reduced from 600 to 520 B.Th.U. When this order was issued, the Company had only 25 days' supply of oil on hand. The Seattle Company, along with two others, agreed several months ago, when the difficulties of the situation became apparent, to finance a series of experiments; and Mr. G. E. Whitwell, a member of the faculty of the University of Washington, was engaged to direct the work. The Seattle Company held that it would be impossible to supply consumers with gas of more than 450 B.Th.U., and that the transition from 600 to 450 B.Th.U., if carried out suddenly, would inflict great inconvenience and hardship upon the consumers. In the meantime, Mr. Whitwell had made a preliminary report in which he advocated a 520 B.Th.U. standard, though urging that it was essential to give the proposal a test on a large scale before putting it into permanent effect. The Commission remark that the average appliance in the kitchens of the State is adjusted to consume gas of 550 to 600 B.Th.U. As it is possible for the calorific value to vary as much as 75 B.Th.U. before the appliance fails to function properly, this means that a 520 B.Th.U. standard makes but little change, while one of 450 B.Th.U. would be disastrous. The Commission added that the gas companies concerned had been required to have available a staff of men skilled in the adjustment of appliances, so that all complaints which appeared to be caused by the lowering of the standard might receive instant attention. The reports which reached them during the first few days of the experiment indicated, however, that the disturbance of the consumers thus far had been very slight. They find no ground for believing that the reduction made in the calorific standard will result in materially increasing consumers' bills. Theoretical calculations show that on the average this increase (if any) will not amount to more than 2 p.ct.

Dr. R. V. Wheeler, who has recently been appointed Professor of Fuel Technology at the University of Sheffield, last Thursday read a paper on "Firedamp Explosions" at a meeting of the Midland Institute of Mining, Civil, and Mechanical Engineers, the President of which is Mr. J. H. W. Laverick.

A small gas furnace for case-hardening has been designed by the Monometer Manufacturing Company, Ltd., of Savoy House, W.C. Working on low-pressure town gas, without blowers or fans, a temperature of 1000° C. can be obtained. The inside dimensions are 16½ in. by 12 in. by 7½ in. The Company expect this model will meet the requirements of experimental engineers, garage owners, and the requirements of laboratory workers.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Silent Aërated Gas-Flames.

SIR,—Will you allow me space to repeat the gist of the remarks I made on the results put forward by Mr. Davies in his interesting paper at Leeds on the 16th ult., as the main portion of my comment has been omitted from the statement attributed to me in your report of the discussion?

It was pointed out by the present writer that the results quoted by Mr. Davies provided strong *prima facie* evidence that the determining factor in the production of flame noise in his experiments was the presence of eddies due to turbulence in the gas stream.

It was mentioned that, according to the works of Reynolds, Stanton, Pannell, and others, the critical velocity above which turbulent flow occurs varies inversely as the diameter of the tube for a given mixture. Thus it follows that the maximum flow in terms of volume which can be produced without turbulence will increase directly as the diameter of the tube.

Mr. Davies clearly demonstrated that the maximum consumption for silence increased directly as the diameter of the tube in tubes of lengths greater than the critical value.

The present writer also mentioned that the explanation of the results given graphically in Diagram No. 1, p. 396 of your last issue, on the basis of turbulence involved the assumption that the viscosity of the gas-air mixture employed by Mr. Davies attained its maximum with a gas content of approximately 27 p.ct.

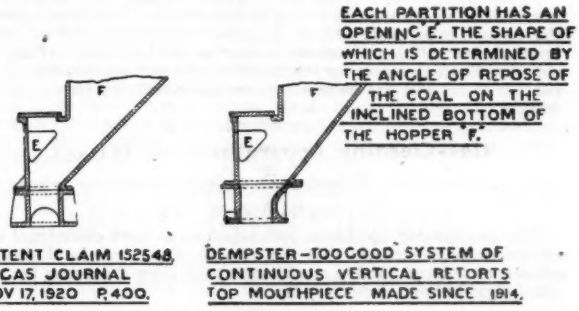
I think, with Mr. Davies, that streakiness in the gas and air mixture can be ruled out of court, at any rate, in by far the great majority of cases; but I appear to differ from him in holding the view that the main cause of noise is turbulence in the stream.

Warrington, Nov. 19, 1920. HAROLD HARTLEY.

Improved Gas Offtake in the Top Mouthpieces of Continuous Vertical Retorts.

SIR,—As an interested party, I can find no difference between the published patent No. 152,548 and the daily practice of the "Dempster-Toogood" system since the year 1914.

As is well known, the "Dempster-Toogood" system has from its inception practised and developed the central feeding of coal to continuous vertical retorts; and this necessitated certain developments to the details of the top mountings, to encourage the gas to leave the retort equally over the whole cross section. These features have been widely published and discussed within the industry.


EACH PARTITION HAS AN OPENING E. THE SHAPE OF WHICH IS DETERMINED BY THE ANGLE OF REPOSE OF THE COAL ON THE INCLINED BOTTOM OF THE HOPPER F.
F
E
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PATENT CLAIM 152548 GAS JOURNAL NOV 17, 1920 P. 400.
DEMPSTER-TOOGOOD SYSTEM OF CONTINUOUS VERTICAL RETORTS TOP MOUTHPIECE MADE SINCE 1914.

I enclose an actual cross section of the two mouthpieces side by side, so that the reader may have the opportunity of easy comparison; and if real difference can be found, it would be generally beneficial for it to be announced.

Nov. 20, 1920. AD REM.

REGISTER OF PATENTS.

Manufacture of Thorium.—No. 151,854.

WADE, H.; a communication from the Lindsay Light Company, of Chicago, U.S.A.

No. 28,749; Nov. 19, 1919.

This invention relates to recovering thorium from its natural mineral sources, and more particularly from monazite sand.

In the ordinary treatment of monazite sand to recover thorium, the sand is heated with concentrated sulphuric acid until it is decomposed, and a soluble pyro-phosphate is then added. This brings about precipitation of the thorium; the other soluble rare earths in the product being retained in solution. The thorium thus precipitated, together with small amounts of accompanying impurities, can be separated by decantation, filtration, or otherwise.

The essential feature of the invention consists in effecting a concentration of the thorium content of the monazite sand by the use of fuming sulphuric acid, instead of ordinary concentrated sulphuric acid as heretofore. Among other advantages secured by doing so is that a considerable shortening of the period of heating is obtained over previous processes in which ordinary sulphuric acid is used, as above described.

Incandescent Gas-Burners.—No. 151,393

CASBON, W., and DUNKINSON, A. J., of Hitchin.

No. 16,910; July 5, 1919.

This invention relates to inverted incandescent gas-burners wherein a baffle or striking plate is arranged in the passage of the burner between the air inlet and the nozzle or support for the mantle—as described in patent No. 17,089 of 1915.

According to the present invention, the baffle, instead of being a separate fitting arranged in the burner-tube, is formed, integral with the nozzle, of porcelain, earthenware, or the like, inserted into the end of the burner-tube and from which the mantle is suspended in the usual manner.

Casbon and Dunkinson's Incandescent Burner.

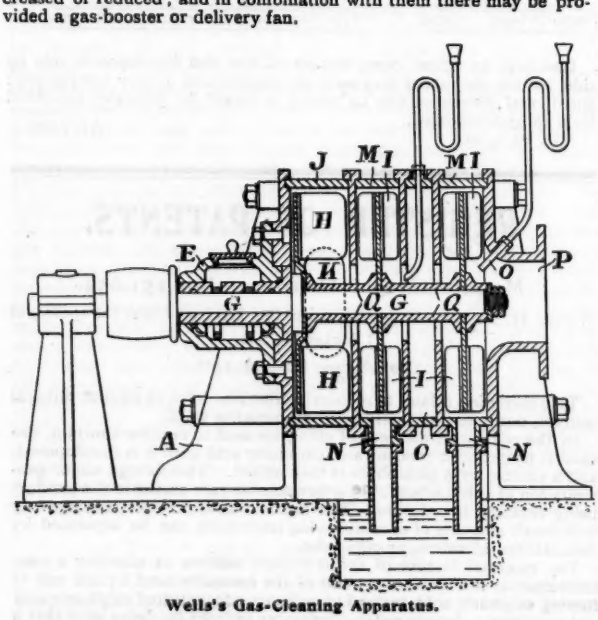
In the illustration, C is the baffle, which is made integral with the nozzle B, to which it is connected by the ribs D. The lower part of the burner tube, which forms a socket into which the nozzle is screwed, has sufficient diameter to receive the baffle and to form the chamber E which serves for the thorough mixture and heating of the mixture of air and gas before it enters the nozzle on its way to the mantle.

Gas-Cleaning Apparatus.—No. 151,443.

WELLS, J. F., of Cairo.

No. 20,504; Aug. 20, 1919.

This gas-cleaning apparatus comprises one or more centrifugal tar-extractors so constructed that the number of units can be readily increased or reduced; and in combination with them there may be provided a gas-booster or delivery fan.



Wells's Gas-Cleaning Apparatus.

In the centre of the standard A is a long bearing E attached to it by bolts made detachable so as to be easily replaced. Through the bearing there runs a shaft G, to which are attached the booster fan H and the tar extraction paddles I. On the face of the standard is a ring piece J provided with a gas outlet K. Following the ring piece is a division plate with a hole through the centre; and following the plate is a tar-extractor ring M fitted with a tar-exhaust or outlet N, extending into a water seal. Within the ring M is a disc fitted to the shaft G and carrying the series of paddles or vanes I. The ring is followed by a division disc and then by a water-service ring O for the provision of water to the centre of the ring M. The water ring O is followed by a division disc, and then by another tar-extractor ring. Two tar-extractor units are shown; but any convenient number may be provided.

After the final tar-extractor ring there is an end plate P forming an inlet for the gas. This plate is further fitted with four bolt bosses corresponding to the bosses on the base plate. When all the parts are in position the various rings and division discs are securely fastened in position; the discs and their paddles mounted on the shaft G being held in their proper positions by distance pieces Q and the whole secured in position.

In the working, the end plate P is coupled by pipes to the gas inlet, where it meets with the water dripping from the pipe O, after which it is immediately expelled to the periphery of the tar-extractor ring by the paddles I revolving at great speed. The gas then passes back to the centre of the extractor against the centrifugal force of the paddles on the other side of the paddle disc. The gas then passes through the hole in the centre of the division plate, at which point water is also allowed to drip, and thence into the second stage of the tar-extractor—finally passing into the booster ring J, from which the clean gas passes out for use.

Automatically and Continuously Analyzing and Recording Gases.—No. 149,752.

RUSSELL, W. D., and PICKSTON, W. T., of Bolton.

No. 12,317; May 16, 1919. No. 26,640; Oct. 30, 1919.

This combined apparatus for the continuous and automatic analysis of flue and other gases by the absorption process and the continuous and automatic recording of such analysis, comprises (in combination): An enclosed gas-collecting vessel; a tube-like cistern alongside the vessel, and connected at its lower end by a pipe to the bottom of the vessel; a gas inlet pipe extending down through the top of the vessel to a point near the lower end; a syphon pipe, the shorter limb of which passes through the top of the vessel, and extends down to a level slightly above the level of the gas inlet pipe, and of larger diameter than the other parts of the syphon pipe; a further pipe, also passing through the top of the vessel and downwards within the vessel to a point about a third of the way down the vessel, and at its other end (outside the vessel) dipping into a water seal; a gas-discharge pipe extending upwards into a thimble-like extension on the cover of the vessel at one end, and downwards through the floor of the vessel, and into a further vessel at its other end—this further vessel being partially filled with chemicals which serve to seal the lower end of the pipe; and a further pipe connected with this further vessel at one end and at the other end entering a liquid seal, controlled by the emptying and refilling of the gas-collecting vessel.

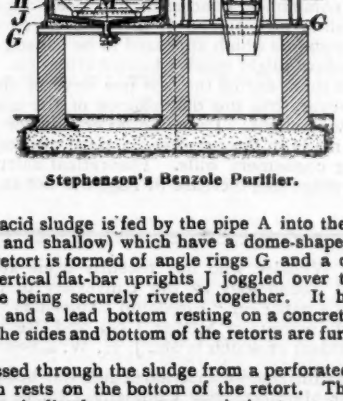
Purification of Benzole.—No. 152,054.

STEPHENSON, G., of Crook, Durham.

No. 10,918; May 2, 1919.

This invention relates to apparatus for dealing with the acid sludge or acid tar produced in the washing or purification of benzole, and for recovering benzole and its homologues.

The illustration shows an elevation and a part sectional elevation of the apparatus.



Stephenson's Benzole Purifier.

A charge of acid sludge is fed by the pipe A into the retorts B (of large diameter and shallow) which have a dome-shaped cover. The casing of the retort is formed of angle rings G and a central flat-bar ring H, with vertical flat-bar uprights J joggled over the angles and bar—the whole being securely riveted together. It has an internal lead lining K and a lead bottom resting on a concrete or mild-steel plate base. The sides and bottom of the retorts are further lined with brick.

Steam is passed through the sludge from a perforated annular lead pipe M, which rests on the bottom of the retort. The holes in the annular ring are inclined so as to ensure intimate contact of the steam with the acid sludge in the retort.

The benzole vapour emitted, together with the acid impurities above referred to, are discharged through the outlet swan-neck pipe N resting on the dome. The vapour in passing into this pipe is met by an ammonia jet or spray P, either vapour or liquid. The vapour then

passes through a lead-lined catch-box or scrubber Q filled with coke or other absorbent materials, and containing dilute acid to absorb any ammonia that may be carried over with the benzole vapour. This catch-box or scrubber is fitted with a cock R having a funnel on its inlet flange to pour in dilute sulphuric acid. A cock S is fitted on the bottom of the catch-box or scrubber—for drainage purposes and to recover the ammonia absorbed in the dilute acid. A steam-coil is fitted inside the catch-box or scrubber for the purpose of volatilizing any liquid benzole which might condense. The benzole vapour and its homologues pass away to a condenser; and the benzole is discharged into a separator of ordinary type, to separate the water which passes over with the benzole.

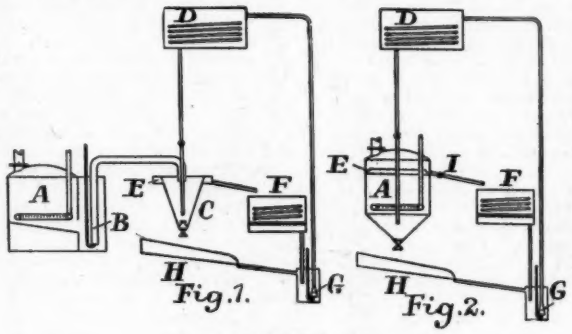
Manufacture of Sulphate of Ammonia.—No. 152,766.

LESSING, R., of High Holborn, W.C.

No. 18,058; July 21, 1919.

It is known, the patentee remarks, that sulphate of ammonia as produced in the ordinary way—apart from other impurities, such as free acid—contains certain substances which impair the white colour of the product. The impurities are introduced partly with the ammonia gas entering the saturator and partly with the sulphuric acid employed. Their formation in the final product depends, apart from their existence in the raw materials, upon the design of the saturator and mode of working; the "capacity of producing clean salt varying immensely between different works."

He claims to have found that in most samples of dirty sulphate, the colouring impurities are deposited upon the crystals formed in the saturator, and that they can be removed by agitating the crystals with a saturated solution of sulphate of ammonia containing some free acid, when the impurities will detach themselves from the crystals and remain suspended in the solution. By his invention a perfectly white salt can be produced from dirty sulphate of ammonia by thus agitating it with an acid solution of sulphate of ammonia and floating the impurities off by an upward current of the solution, the velocity of which is so adjusted that it will carry the fine dirt particles but will not carry the crystals themselves above a definite and predetermined height.



Lessing's Sulphate Plant.

Fig. 1 shows a plant with a separate treatment vessel; while fig. 2 incorporates a saturator adapted for the working of the process.

In fig. 1, A is a saturator from which the sulphate of ammonia crystals paste is discharged by a steam lift B and allowed to drop into the conical vessel C. Filtered sulphate of ammonia solution runs from the feed tank D (which is provided with steam-pipes) into the lower part of the treatment vessel; its velocity being regulated by a valve. The solution rises upwards in the vessel and overflows into an annular launder E, and from there through a pipe or shoot into a filter tank F, also provided with steam-coils. The filtered solution is raised to the feed tank D by a sump and air lift G. The crystals freed from the colour-giving impurities are discharged through a grate-valve on to a draining table H or directly into a centrifugal machine. The liquor drained off discharges into the sump G along with the filtered solution.

Fig. 2 shows a saturator of the bottom discharge type, in which an annular launder E is provided. The solution enters the saturator and overflows through the launder and cock I, which is closed during the ordinary working of the saturator. The remaining parts of the cycle correspond to those shown in fig. 1.

PARLIAMENTARY INTELLIGENCE.

NOTICES GIVEN FOR BILLS (SESSION 1921) RELATING TO GAS SUPPLY.

Up to the present time, there have been but few notices given of the intention to promote in the 1921 session of Parliament Bills in connection with gas undertakings.

Harrogate Gas Company.—Notice is given by the Harrogate Gas Company of their intention to apply for leave to bring in a Bill for the conversion of the existing ordinary stock into one class of stock; to authorize the transfer from the net revenue account to the special purposes fund of a sum representing the amounts which, under the Act of 1909, they might have appropriated at any previous period, but did not do so; to enable them to make certain transfers to the reserve fund, and to capitalize the fund and distribute it to the holders of ordinary stock as fully paid-up consolidated stock. Further capital powers are sought, and the substitution for existing provisions of the system of charging for gas by heat units; and there will be clauses relating to purity and pressure, testing, penalties, a standard or basic rate of dividend, and differential charges. Provision is to be made in the matter of the distribution of bonuses to the employees under a co-partnership scheme; for the holding of annual meetings; to repeal, alter, or amend section 32 of the Act of 1909, and to authorize the Company to supply power gas which does not possess a distinctive and easily perceptive smell; and for the application of a larger proportion of the money available to the payment of ordinary dividends in excess of the standard or basic rate or to the reserve fund in any year in which the chief gas examiner shall certify that the gas supplied by the Company was on the average of greater purity than the prescribed degree of purity to such extent as may be specified in the Bill.

Manchester Corporation.—The Manchester Corporation give notice of a General Powers Bill, the first portion of which will deal with the gas undertaking. It is desired to secure power to acquire further lands for the purposes of the undertaking, and to erect thereon works for the manufacture and storage of gas, and for the treatment of residual products. The lands scheduled are in the townships of Partington and Carrington. The Corporation will further ask to be empowered to make and maintain roads, bridges, and works indicated in the townships of Partington, Carrington, Flixton, and Davyhulme, and the urban districts of Urmston and Stretford; and to lay mains from the proposed new gas-works to the boundary of the Corporation's area for the supply of gas. This scheme was referred to in a paragraph appearing on p. 408 of last week's "JOURNAL." Power will also be sought to purchase and carry on the undertaking of the Stretford Gas Company; and there will be provisions relative to price, calorific power, pressure, and testing of gas, and to the borrowing of further money.

South Metropolitan Gas Company.—A Bill is to be promoted by the South Metropolitan Gas Company, to empower them to raise as permanent capital any capital which they are now authorized to raise as temporary capital, and to raise additional capital; to make new provisions as to the form in which the accounts of the Company shall be made out, and the particulars to be shown therein; to amend the provisions with respect to the purity of the gas supplied; to deal with Directors' and Auditors' fees and qualifications. A clause is to be included to give power to the Board of Trade or other authority to relieve the Company from the obligation to supply gas in certain cases, and in particular in any area where the circumstances are of such a character as to render the supply unremunerative, or in other circumstances in which the Board of Trade or other authority may consider it unreasonable that the Company should be required to give a supply of gas and to provide for inquiries into any such matters.

PROVISIONAL ORDER APPLICATION.

Dundee Gas Commissioners.—Application is intended to be made by the Commissioners to the Secretary for Scotland for a Provisional Order to authorize them to acquire further lands for the purposes of the gas undertaking; to borrow money; to undertake mainlaying operations in streets and places whether dedicated to the public use or not; to lay-down pipes for tar, oil, and other materials; to levy or alter gas rates, rents, or charges, and extinguish exemptions from the payment thereof; and to authorize them to carry into effect agreements for the sale of any land or works.

LEGAL INTELLIGENCE.

LIABILITY FOR GAS EXPLOSION IN A SEWER.

An interesting case was heard at Sunderland County Court on Monday, when Catherine Mewburn, aged 14, claimed £100 damages from the Sunderland Corporation and the Sunderland Gas Company in respect of injuries she sustained through an explosion of gas from a Corporation sewer manhole on July 7.

The girl was passing near the manhole when she noticed a strong smell of gas, and just afterwards a man who was also near struck a match for the purpose of lighting his pipe; and this led to an explosion, which blew off the manhole cover. The girl was picked up some 30 or 40 yards away, and had to be attended to at the infirmary. The facts were admitted; and the only question was as to who was negligent, and ought to be sued. The explosion took place in the Corporation sewer; but they said it was not their gas which exploded, and in the event of their having to pay they would look to the Company for recompense. On behalf of the Company it was stated that the gas-pipe which had fractured was laid some six years ago, and should have lasted in the ordinary way 30 to 40 years or more. The break in the pipe was a clean break, as if it had been cut. The manhole had just previously been constructed by the Corporation for the purpose of inspecting sewers; and the excavation had been carried lower than the gas-pipe, which was found 8 or 9 in. out of position in consequence of subsidence. The Corporation had failed to notify them of their intention to excavate for the purpose of constructing the manhole. The Corporation, on the other hand, contended that the gas pipe was faultily laid.

His Honour found that the Corporation had been negligent in failing to notify the Company of their intention to excavate; and he awarded the plaintiff £20 damages against them.

Hawes Acetylene Gas Company, Ltd.—Notice is given of a meeting of shareholders of the Company for the purpose of receiving an account of the winding-up of the Company.

MISCELLANEOUS NEWS.

ORIENTAL GAS COMPANY, LTD.

The Ordinary General Meeting of the Company was held last Wednesday, at Finsbury House, Blomfield Street, E.C.—Mr. H. D. ELLIS in the chair.

The SECRETARY (Mr. S. Rainer) read the notice convening the meeting; and the Directors' report and the statement of accounts for the year ending June 30 were taken as read, and the Auditors' certificate was read.

WORKING RESULTS.

The CHAIRMAN, in moving the adoption of the report and accounts, said the Directors stated, in the second paragraph of the former, that the revenue account showed a satisfactory result for the year. He proposed to give a brief review of the work, so as to acquaint the proprietors with the position more clearly. During the year the quantity of coal carbonized was 4700 tons more than in the preceding twelve months, the gas made showed an increase of no less than 12·6 p.ct., and that gas was of high quality. Moreover, the quantity of unaccounted-for gas was lower by not less than 5¾ p.ct. These statistics were eminently gratifying. The quality and purity of the gas supplied were well maintained; and the average illuminating power was higher than in any of the four preceding years—a fact attested by the official testings made by the Corporation of Calcutta. Not a single claim against the Company was made in respect of defective pressure of gas supplied to the public lamps, notwithstanding that the number of lamps on the remote borders of the district of supply was constantly increasing. He would quote only one brief extract from the annual official Blue Book of the Corporation issued last September, which recorded that the efficiency of the public lighting had been well maintained, that the gas pressures had been satisfactory, and that the quality of gas supplied had been up to the prescribed standard. The fidelity with which the Company had discharged their duties to the Corporation and citizens of Calcutta had been productive of most amicable relations. With regard to the distribution department, many miles of new mains had been laid, and old mains had been relaid. A fair proportion of this work had been executed for the Calcutta Improvement Trust in pursuance of their great schemes of street improvement; and other parts had been done in promotion of the Corporation's plans for the extension of the public lighting. The private lighting branch of the business continued to make highly gratifying advances. Gas was in ever-increasing demand for a multiplicity of power and heating purposes—for cookers, hot-plates, geysers, boilers, industrial furnaces, and many other minor purposes, which contributed their quota towards the formation of a very satisfactory aggregate.

A REVIEW OF THE ACCOUNTS.

Now he would turn to the accounts, and ask the proprietors to look first at the credit side of the revenue account. It would be seen that the gas rental was higher by no less than £10,360; and the increase was in both public and private lighting. This was very satisfactory. The public lighting increase was largely owing to the resumption of normal lighting, which had been interrupted during the war; and in private lighting the increase was no less than £5000. The residual products showed an increase of £3517 over the previous year. This was largely attributable to coke, well supported by tar and sulphate of ammonia. In the matter of exchange, they had something extraordinary. This was simply owing to the high rate of exchange that obtained during the financial year. The average rate of their remittances was 2s. 2·329d. to the rupee. He believed it touched a maximum of 2s. 10d. But the average for the whole twelve months was nearly 2s. 2¼d. It had since fallen; and he was afraid it might fall lower still. He would not prophesy; but the previous day it was down to 1s. 8d. On the debit side the first item was coal, purification, and wages. This showed an increase of £5070, which would surprise nobody. They had carbonized 4700 tons more coal; and the cost of coal and wages had, as elsewhere, gone up considerably. Even then the value of the residual products had just about balanced the total expenditure on coal, purification, and wages. Salaries in India, and in London, showed the very small increase of £340. He believed there was one more appointment drawing salary. The next item that called for notice was mains, meters, services, and fittings, £16,850. There was an increase in this, chiefly attributable to meters and fittings. They had expended considerable sums on meters and stoves, which, of course, they could not do while the war and its after-effects were being felt. They had now expended the money; and most of the meters and stoves were out on consumers' premises, where they were earning good money for the Company. In fittings, mantles were chiefly responsible for the increase. Mantles had largely risen in price; and they could not get them any cheaper. These mantles were also doing good work. Coming to the wear and tear on works, that was large. But it was debited with part of the value of the obsolete plant which was referred to in the report. A holder, which had done fifty or sixty years' good service for the Company, was entirely worn-out, and had to be taken down. The value of this, less the sale of the scrap (which came to something), and a portion of the cost of No. 1 retort-house, were debited to wear and tear of works, and so produced the larger sum, which happily they were able to meet. To renewals suspense account they carried £10,000. Bad debts and allowances (£1142) were less than half what they were this time last year. Under general expenses (£5489), there was an increase which arose from a multiplicity of items—law charges, other professional charges, and travelling expenses of officers on leave. Several officers returned home for leave according to the terms of their engagement. The Company paid their fares to come to England, as well as their return fares. They got a period of recreation and fresh air here, and went back both stronger and better fitted to discharge their duties. They had appointed three new officers during the year, who had gone out—two of them with their wives. The total expenditure was £101,047; and there was a balance of £29,090, which was £2898 more than the corresponding figure for last year, and which was carried to the credit of the profit and loss account. In the balance-sheet, the capital stock was the same. Reserve fund, depreciation account, and exchange equalization account were the same, and renewals suspense account was more by £10,000. The amount due by the Company, including outstanding dividends and sundries (£11,144) was larger by £2700. This included some bills in the June account not paid on June 30; and so they went forward as a liability. On the credit side, the Directors had written down by £20,000 the expenditure on capital account—that was part of the value of the Howrah land which they sold. The value of the demolished holder and some retort work, less the debits, had also been written off. This produced £20,886, which was charged to the reduction of capital—the assets representing it being no longer in existence. The amount due to the Company (£2399) was less than last year. Coal, products, and sundry stores (£25,584) were written-down. They were £1465 less than they took credit for a year ago. The investments had not been varied. The cash in Calcutta and London amounted to £66,312. This was largely due to the very high rate of exchange, to the proceeds of the Howrah land, and generally to trade expansion—in fact, there was a multiplicity of things which went to make up this considerable sum. The large amount of cash, he might tell them, would all be required. He would not say it would all be expended in the present year, as he was afraid they would not be able to complete all the important work upon which they had now been able to start. The work had been held-up for years. They were not then able to get anything out to Calcutta, as they would have done in the ordinary course; and they had naturally put-by the money to expend upon the works as soon as they were able to take them in hand. They were in hand now, and would be of enormous advantage to the Company when completed.

THE STRIKE OF GAS-WORKERS.

This completed his history of the affairs of the Company during the financial year; but he thought the proprietors would like to hear a few words with regard to the strike. It did not come in the financial year; but it was a matter which must be keenly present in their minds. They had probably read of it in the Press. The strike agitation in many of the big centres of population in India had been in operation for some weeks prior to Oct. 6. In Bombay the postal service, the tramways, and the gas-works were involved; but in Calcutta it had not extended beyond the tramway service. On Wednesday, Oct. 6—Mr. Snelgrove being then at Darjeeling to recuperate from serious indisposition—and Mr. Pearson, his first assistant, being in charge of the works, the men demanded an increase of 50 p.ct. on their pay. This, of course, was out of Mr. Pearson's power to grant; and the men went out on strike at five o'clock the next morning. Having telegraphed to Mr. Snelgrove, and received a reply that he would return forthwith, Mr. Pearson concerted measures to deal with the situation as well as circumstances would permit. The European staff resolved, with the assistance of the foremen, Babus, and a few old hands to the number of 19, to carry on as long as possible. They mustered 98 all told; but many of them were not physically qualified to do much. The public lamps were at once reduced in number, by order of the Chairman of the Corporation, to the lowest possible margin, and at reduced pressure. Fair progress was made; and the holders began to fill. Seeing this, several of the strikers wished to return; but were driven back by hired budmashes armed with lathis. These ruffians, moreover, attacked and looted the gharries bringing in provisions for the faithful workers. On Oct. 8 and 9, difficulties were caused by hot bearings, and an accident to the belt of the charging machine; and after a hard struggle and most meritorious exertions, the forlorn hope of workers became thoroughly exhausted, and gas-making ceased. On Oct. 12, after consultation with the Chairman of the Corporation and several Commissioners, Mr. Snelgrove threw open the main gates, and tried to induce a body of strikers who were moving towards them to return to work; but they were driven back by the bludgeon men, and the police had to intervene. Notices were printed and posted all round the works, notifying that they would be reopened on the 13th; but the men were too much intimidated by the bullies to come in. By the 17th Mr. Snelgrove had succeeded, through labour agencies, in getting in about fifty firemen; and he started gas-making again that morning. This was successful; and hourly increasing makes were accomplished. The strike was broken; and before many days had elapsed all the old hands were back at the old rates of pay, and normal conditions were resumed with the utmost despatch. He (the Chairman) thought the strikers had learnt a useful lesson, and would be wiser in future.

Mr. MACKAY: How many men do you employ?

The CHAIRMAN: About 1000. Continuing, he said it was a spurious and artificially manufactured strike—planned, organized, and directed as part of a great scheme of Indian unrest, and, if possible, of Indian rebellion, by foreign miscreants working with Bolshevic gold. The Company's men were not disaffected. Only two or three months previously, the Directors had recognized the fact that the increased cost of living was bearing hardly upon them; and they gave them a material rise in their rates of pay, with which they were evidently well pleased. Moreover, at a conference (during the strike) between the General Manager and the Chairman of the Corporation and several Commissioners, these gentlemen emphasized their satisfaction with the Company's rates of pay, and the liberal treatment accorded to the men by the Company. He thought it important these facts should go out to the public, to let them know the true position. The Company's men were not drawn from the literate classes; they were impressionable, and were thus exposed to the danger of misguidance by evil counsellors. Indeed one of their own spokesmen—a native pleader—afterwards admitted to the General Manager that he had been misled as to the merits of the case. The Board highly appreciated Mr. Snelgrove's strenuous and judicious efforts during this crisis—all the more trying as he was then suffering from ill-health. He (Mr. Snelgrove) accorded high praise to Mr. Pearson, the Assistant Engineer, for his foresight and promptitude in concerting measures for combating the strike, and protecting the Company's property. To Mr. Savage, then acting as Works Superintendent, upon whom rested the brunt of the work of carrying on gas-making operations during the strike and of reorganizing the labour staff on the resumption of work after it, Mr. Snelgrove also paid a tribute of high praise. And each and all of the faithful

workers devoted their best powers to help the Company in this crisis. He (the Chairman) thought it would be gratifying to the proprietors to hear they had officers who could deal with an emergency so promptly, so cleverly, and so courageously.

Mr. A. T. EASTMAN seconded the motion.

DIVIDENDS FROM THE PROFITS ON EXCHANGE.

Mr. J. H. MACKAY said it was impossible to criticize the balance-sheet; it was so favourable and satisfactory. But he ventured to raise a question as to the rate of dividend the Board were proposing to declare. He found that the dividend they were to receive did not amount to the profit that had been made by the rate of exchange, which meant that all the profits derived from the working were going to be applied to the purposes of the Company *in futuro*. They were having their dividend paid entirely out of the profits made on exchange.

The CHAIRMAN: Not in previous years.

Mr. MACKAY (proceeding) said that when one came to be an octogenarian, then one began to think of present dividends rather than future prospects. In an exceptional case like this, he thought the Directors ought to have given the proprietors a bonus. He was not going to move a resolution; but he would appeal to the Board to be a little more generous.

The CHAIRMAN said he was not surprised this question had been raised. The Directors were men of like passions to those of the rest of the proprietors; they were not insensible to the attractions of higher dividends, and when the accounts were made up they had asked themselves the same question. After pondering the matter, and looking at it from all sides, they came to the conclusion unanimously that the present was not an auspicious time to increase the dividend. Much of the cash that appeared to the credit of the balance-sheet was the accumulation of past years, when they carried it to renewals suspense account. He was careful to point out every year that these accumulations did not represent divisible profits. They were moneys they would, if they had not been prevented by the war, have devoted to the wear and tear of the plant, and to improvements of the works. He had remarked in the course of his speech, with reference to the amount of cash to the credit of the balance-sheet, that the works they had now in hand would require a large amount of money. If the money were devoted to other purposes, they would have to borrow from their bankers, or they might perhaps have to issue further capital, which had never been done since he became connected with the Company now some twenty-seven years ago. It had been their invariable practice to discharge all the capital claims out of revenue. The money they had here, applied to the purposes in hand, would earn future dividends. It would be an unfortunate thing for the Company if they were to declare a higher dividend this year, which they were unable to maintain next year and afterwards. He hoped the proprietors would understand the position of the Directors, and the view they took as the trustees of the proprietors' interests.

The motion was unanimously carried.

THE DIVIDEND.

Moved by the CHAIRMAN, and seconded by Mr. STANLEY H. JONES, a dividend of 8 p.ct. (less the interim dividend and income-tax) was declared for the twelve months.

RE-ELECTIONS.

On the motion of the CHAIRMAN, seconded by Mr. H. H. MACLEOD, Mr. Stanley H. Jones was re-elected to his seat on the Board.

Proposed by Mr. W. C. ELLISON, and seconded by Mr. J. MITCHELL, the Auditors (Messrs. Savage and Gill) were re-appointed.

VOTES OF THANKS.

The CHAIRMAN moved a vote of thanks to the Manager, Secretary, and staff generally for their services during the past year. He most emphatically impressed upon the proprietors that they had a very able, zealous, and devoted staff from the highest to the lowest. Mr. Snelgrove was an admirable manager, and had tact and discretion. Mr. Pearson, his assistant, was a man of ability, courage, and resourcefulness. The other English members of the staff—Messrs. Bacon, Smith, Morrison, Garsed, Savage, and Hayward—were working well. They all knew Mr. Rainer, and his courtesy and attention, so that he need not say anything as to his good qualities.

Mr. BERTRAM W. ELLIS, in seconding, said the Chairman had gone over the events of the last few weeks in Calcutta. Never in the history of the Company—certainly not since he had had anything to do with it—had the members of the staff, particularly in Calcutta, deserved their annual vote of thanks more than on this occasion. He was perfectly sure the proprietors would agree with him in this. Had the members of the European staff who had been over here the last few months not been absent during the strike period, the Board knew perfectly well they would have carried on just the same as the others had done, and would have equally deserved praise. Their absence on leave was a great benefit to the Company, because they went round works in this country, and saw the developments here in gas-making and supply which had occurred since they were last in England. They acquired a lot of up-to-date knowledge, and returned to Calcutta, and applied it there for the benefit of the Company. With regard to the London staff, he echoed with the greatest pleasure the Chairman's remarks.

The motion was cordially agreed to.

Mr. RAINER asked the proprietors to accept his personal thanks, as well as thanks on behalf of his colleagues—the General Manager and his staff—in Calcutta. He should have much pleasure in conveying to them a vote which this year was perhaps deserved more than ever before.

Mr. J. C. WATSON moved a vote of thanks to the Chairman and Directors, who, he said, had passed through a most strenuous period. He (the speaker) knew a great deal of the circumstances of Calcutta life; and he could say that the Manager and the staff had in the recent emergency done very well indeed. The anxieties of the year had been largely tempered by the very admirable rate of exchange. Long might it continue. In conclusion he suggested that perhaps the Board might see their way to pay the dividend free of income-tax.

Mr. MACKAY seconded the motion.

The CHAIRMAN, on behalf of his colleagues and himself, cordially thanked the proprietors.

GAS REGULATION ACT APPLICATIONS.

The following further notices appear in the "London Gazette" of applications by gas undertakings to the Board of Trade under section 1 of the Gas Regulation Act for Orders providing for—(*a*) The repeal of any enactments or other provisions requiring the undertakers to supply gas of any particular illuminating [or calorific] value, and the substitution therefor of power to charge for thermal units supplied in the form of gas; and (*b*) the modification of the statutory or other provisions affecting the charges which may be made by the undertakers by substituting for the maximum [or standard] price per 1000 c.ft. now authorized, with an addition to meet increases in the costs and charges of, and incidental to, the production and supply of gas by the undertakers since June 30, 1914, a maximum [or standard] price per therm (100,000 B.Th.U.).

A copy of the applications made to the Board of Trade, and of all the documents submitted therewith, may be inspected, free of charge, at the gas offices concerned.

Any local authority or person desiring to make representations with regard to the application may do so by letter addressed to the Assistant Secretary, Power, Transport, and Economic Department, Board of Trade, Great George Street, S.W., and posted not later than the date specified in the notice.

Cardiff Gas Light and Coke Company.

The maximum prices now authorized in respect of the supply of gas by the undertakers are: 3s. per 1000 c.ft. within the City of Cardiff and the urban district of Penarth; 3s. 3d. per 1000 c.ft. in the rural district of Llandaff and Dinas Powis (except the parish of Pentyrch); and 4s. per 1000 c.ft. within the remainder of the limits of supply (including the parish of Pentyrch). The prices which they have asked the Board of Trade to substitute for these are: 1s. 7d. per therm within the City of Cardiff and the urban district of Penarth; 1s. 7·707d. per therm within the rural district of Llandaff and Dinas Powis (except the parish of Pentyrch); and 1s. 9·824d. per therm within the remainder of the limits of supply (including the parish of Pentyrch).

Croydon Gas Company.

The standard prices authorized or prescribed, and the prices which the undertakers have asked the Board of Trade to substitute for them are as follows:

Within the limits of supply of the Company as existing prior to the passing of the Croydon Gas Act, 1905, for the present standard price of 4s. 7d. per 1000 c.ft.. the standard price of 1s. 7d. per therm.

Within the Caterham and added areas as defined by section 16 of the Croydon Gas Act, 1905, a price exceeding such standard price by an amount never more than 0·8d. per therm.

Fleetwood Gas Company.

In addition to providing for (*a*) and (*b*), the notice contains the following:

(*c*) Such modification of any provisions whereby the rate of dividend payable by the undertakers or any other payment is dependent on the price of gas supplied as may appear to the Board of Trade to be necessary.

The standard price now authorized in respect of the supply of gas by the undertakers is 4s. 2d. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 8d. per therm.

Frome Gas Company.

The standard price now authorized in respect of the supply of gas by the undertakers is 4s. per 1000 c.ft.; and the price which they have asked the Board of Trade to substitute for this is 1s. 9d. per therm.

Maidstone Gas Company.

The standard price now authorized in respect of the supply of gas by the undertakers within the borough of Maidstone and outside the boundary of the borough but within a radius of one mile and a half from the Town Hall, Maidstone, is 3s. 7d. per 1000 c.ft.; and the price which they have asked the Board of Trade to substitute for this is 1s. 5½d. per therm.

The standard price now authorized in respect of the supply of gas by the undertakers outside the above-mentioned radius (but excluding the parishes and places named in section 4 of the Maidstone Gas Act, 1907) is 4s. 4d. per 1000 c.ft.; and the price which they have asked the Board of Trade to substitute for this is 1s. 7d. per therm.

Newark Gas Company.

The standard price now authorized in respect of the supply of gas by the undertakers is 2s. 11d. per 1000 c.ft.; and the price which they have asked the Board of Trade to substitute for this is 1s. 4d. per therm, and 1s. 5½d. for gas supplied beyond the borough of Newark.

Penistone and District Gas Company, Ltd.

The standard price now authorized in respect of the supply of gas by the undertakers is 3s. 6d. per 1000 c.ft.; and the price which they have asked the Board of Trade to substitute for this is 1s. 6d. per therm.

Plymouth and Stonehouse Gas Light and Coke Company.

The standard prices now authorized in respect of the supply of gas by the undertakers are 2s. 6d. per 1000 c.ft. in respect of Plymouth and Stonehouse, and 3s. 6d. per 1000 c.ft. in respect of the parishes of Tamerton Folliott, Egg Buckland, and Plymstock; and the prices the undertakers have asked the Board of Trade to substitute for these are 14·6d. per therm and 17·2d. per therm respectively.

Ramsbottom Gas Company.

The maximum price now authorized in respect of the supply of gas

by the undertakers is 5s. per 1000 c.ft.; and the price which they have asked the Board of Trade to substitute for this is 1s. 8d. per therm.

South Normanton and Blackwell Gas Company.

The standard price now authorized in respect of the supply of gas by the undertakers is 5s. per 1000 c.ft.; and the price which they have asked the Board of Trade to substitute for this is 1s. 9d. per therm.

South Suburban Gas Company.

The standard prices authorized or prescribed, and the prices which the undertakers have asked the Board of Trade to substitute therefor, are as follows:

(i) In the South Suburban district of the undertakers, as defined by section 5 of the South Suburban Gas Act, 1912, for the standard price of 2s. 9d. per 1000 c.ft., prescribed by section 2 of the South Suburban Gas Act, 1906, the standard price of 1s. 5d. per therm.

(ii) In the Bromley district of the undertakers, as defined by section 5 of the South Suburban Gas Act, 1912, such standard price per therm, with the addition shown in the third column hereunder.

For period ending	Present Differential Price per 1000 C.Ft.	Proposed Differential Price per Therm.
	d.	d.
June 30, 1921	5	1½
,, 1922	4	1
,, 1923	3	¾
,, 1924	2	½
,, 1925	1	¼

(iii) In the West Kent district of the undertakers, as defined by the said section 5 of the South Suburban Gas Act, 1912, such standard price per therm, with the addition shown in the third column hereunder.

For period ending	Present Differential Price per 1000 C.Ft.	Proposed Differential Price per Therm.
	s. d.	d.
June 20, 1922	1 2	3
,, 1925	0 7	1¾
,, 1926	0 6	1½
,, 1927	0 5	1
,, 1928	0 4	¾
,, 1929	0 3	½
,, 1930	0 2	¼
,, 1931	0 1	*Nil.*

(iv) In the Dartford district of the undertakers, as defined by section 5 of the South Suburban Gas Act, 1918, such standard price, with the addition shown in the third column hereunder.

For period ending	Present Differential Price per 1000 C.Ft.	Proposed Differential Price per Therm.
	d.	d.
Dec. 31, 1922	2	½
,, 1923	2	½

Whitworth Vale Gas Company.

The maximum price now authorized in respect of the supply of gas by the undertakers is 6s. per 1000 c.ft.; and the price which they have asked the Board of Trade to substitute for this is 2s. per therm.

New Carbonizing Plant for Stockton.—The Town Clerk recently informed the Stockton-on-Tees Town Council, in regard to the proposal to instal new retorts, that an application had been made to the Ministry of Health for sanction to the borrowing of £25,000, but no reply had yet been received. The Gas Manager (Mr. W. W. Atley) remarked that it was of the first importance that the contract with Messrs. Drakes, Ltd., for these retorts should be completed at once, in order that the whole of the work promised could be carried out by Oct. 1 of next year; and it was agreed that the contract should be completed forthwith, and the Ministry informed of it.

Munich Carbonizing Chambers at Darwen.—Mr. T. Duxbury, the new Mayor of Darwen, made a reminiscent speech on the occasion of his appointment. He has been in public life since 1866; and 44 years ago was appointed Manager of the Darwen Gas and Water Works. Mr. Duxbury boldly declared that the Corporation were overcharging consumers to the extent of 8d. per 1000 c.ft. He also laid down the principle that each department should pay its own way, describing the transfer of profits to the relief of rates as an "unjust and iniquitous system." As a gas expert, Mr. Duxbury ventured the opinion that the Munich carbonizing plant installed at the gas-works when war broke out was not the success anticipated. His view is that "a renewal of the horizontals at the works would have beaten the results considerably, at a cost of about £5000; whereas the new German plant cost over £22,000." He quoted the following results of the past five years' working of the plant: Gas sold per ton of coal, five years ending March, 1920, German plant, 10,418 c.ft.; gas sold per ton of coal previous five years, with a dilapidated, tumble-down condemned plant of horizontals, 10,215 c.ft.; improvement with new plant, 203 c.ft. "I do not," he said, "know of any English vertical retorts where the increase is so poor. This is not the fault of the manager so much as it is the fault of the system. The management was the same during both periods of five years."

LEVEN AND METHIL GAS ARBITRATION.

Purchase by the Burgh of Buckhaven.

The report is now completed of the proceedings in these Scottish gas arbitrations, by giving an indication of the case for the Local Authorities in the inquiry held [*ante*, p. 402] to fix the terms on which the Leven and Methil Gas Company, Ltd., were to be taken over by the Burgh of Buckhaven, Methil, and Innerleven. The Leven Company were offered £37,967, but stood out for £72,200, together with £2398 for loose assets. The final finding by the Oversman (dated Oct. 25) put the price to be paid at £43,554 inclusive. The figure of £41,641 mentioned last week was the "proposed finding." In the East Wemyss case, already reported, the Arbitrators (Messrs. Henry Woodall and W. Doig Gibb), after hearing the case along with the Oversman, agreed, and did not refer the question to the Oversman—for the first time, it is believed, in Scotland—so that the "proposed finding" of £21,050 was not altered.

The arbitration took place in the North British Station Hotel, Edinburgh, with Lord ASHMORE as Oversman. Mr. HENRY WOODALL acted as Arbitrator for the Town Council; and Mr. ALEXANDER YUILL for the Gas Company.

Counsel appearing were: Mr. ALEXANDER MONCRIEFF, K.C., and Mr. J. B. PATON (instructed by Messrs. Smith and Grant), for the Company; Mr. A. H. B. CONSTABLE, K.C., and Mr. W. T. WATSON (instructed by Mr. Robert Leslie and Messrs. Pearson, Robertson, and Maconochie), for the Town Council. Mr. J. A. STUART was Clerk and Legal Assessor.

THE CASE FOR THE TOWN COUNCIL.

Mr. *Kenneth Henderson*, chartered accountant, of the firm of Messrs. Dingwall, Peden, and Henderson, who was the first witness for the Council, examined by Mr. CONSTABLE, said that of recent years there had been variations in the profits, sometimes up and sometimes down. For example, contrasting the year 1909-10 with 1910-11, he found a fall of £770 in the actual profit recorded in the Company's accounts. Adding on income-tax, the rate of dividend distributed was since 1912 never less than 12 p.ct., nor since 1914 had it been less than 13 p.ct. He put in a joint valuation by himself and Mr. W. R. Herring, arrived at by the application of a certain multiplier to the maintainable profit that he (witness) brought out. He agreed with many of Mr. Gowan's figures. There was a difference in the unaccounted-for gas; but this probably was caused by the public lighting estimates and the gas used on the works. His percentage of gas unaccounted-for was 11·73, and that of the other side 9·1. Other differences he proceeded to point out. Messrs. Napier's and Gowans' net profit came out at £3399; while witness's figure was £3116, or a net difference of £283. This difference had really arisen under three heads. In the first place, while Mr. Napier had taken a figure for maintenance based upon 6d. per 1000 c.ft., Mr. Herring had put in a figure based upon a 7½d. allowance. This accounted for a large part of it. In the second place, Mr. Napier and Mr. Gowans admittedly had taken no account of a sinking fund for the cookers. In the third place, there was a vital difference in the figure for the replacement of meters. Deducting from the profit he arrived at (£3116), £765 debited for depreciation the year of account, and £500 which was put to reserve, brought out a net multiplicand of £1851; and applying the multiplier he had already explained in the East Wemyss case, he got a total value of £22,212.

Mr. MONCRIEFF (in cross-examination): Do you maintain that the £22,212 in this valuation is a fair estimate of value, though it brings out a figure somewhat less than the value of the bare structure? Does it not occur to you that you ought to suspect the calculations upon which your figure has been reached?

Witness: No. I admit the profit of £3116 as having been earned by the Company in the year under review; but I do not admit that the £1265 which I have deducted can be considered maintainable. The reason of the valuation which you consider low is the deduction of this £1265.

Does it not occur to you that it cannot be legitimate to make a deduction of £1265, if the result of making it is to bring out a value less than the value of the actual structure?—I never considered it in that light at all. It certainly gives you a result which to some extent is anomalous—that the figure we arrived at as a valuation is so much less than the market value of the Company as determined by the prices at which the shares are being transferred. My valuation—or rather the valuation of Mr. Herring and myself—is admittedly less than the cash which has been sunk in the concern, as shown by the Company's books; but one must regard the amount of maintainable profit. We cannot maintain such a profit as these people in fact raised.

As to depreciation which you give against the cooker account, have you proceeded upon the view that every cooker passes from the property of the Company after the lapse of ten years?—No. We have had reference not only to what would be a fair rate of depreciation on cookers, but also to the fact that after ten years the cookers out on hire are allowed to remain with the consumers at purely a nominal consideration for rent. On such cookers and cooking appliances, 10 p.ct. is quite a fair basis of depreciation.

Have you given any allowance in favour of the Company in respect of the fact that upon a change of consumer after ten years, the cooker will again become the property of the Company, and available for a new hiring arrangement at full rates with a new consumer?—No. I have given no consideration to that.

By diminishing their profits by about half, the Company would have only given a difference of 9d. per 1000 c.ft. to consumers?—Yes.

Councillor *James Galloway*, of Buckhaven, said there was a strong feeling in the town that the works should be taken over—due partly to the high price charged for gas as compared with other areas.

Mr. *F. T. Wallace*, a solicitor, of Leven, said that in the course of his practice he had had occasion to buy and sell shares in the Company. He had now instructions to sell 80 shares, if he could get 50s

each for them. He had bought and sold shares at 30s. and 32s. 6d.; and in 1917 he disposed of 75 shares at 42s. 6d. each.

Provost *Matthew Taylor* explained how the arbitration proceedings had come about, and said he did not know anything in particular about the profits the Company were making beyond the dividend which was published in the newspapers. He had no idea that revenue derived from the undertaking was being used by the Company to improve and extend the concern.

Mr. MONCRIEFF (cross-examining): You hold no office in the Leven Town Council. Could no member of the Council be found to speak to the dissatisfaction with the price of gas in Leven?

Witness: We never tried it.

Mr. CONSTABLE: Does it happen accidentally that there is a certain intermingling of membership between the Town Council of Leven RND the Leven Gas Company which renders the Town Council of Buckhaven a more neutral body on the subject?

Witness: Yes.

Mr. *W. R. Herring*, examined by Mr. CONSTABLE, said he had carefully examined the works and books of the Company. There was an abnormally large proportion—42½ p.ct.—of pipes of 2½ in. and under. As to the claim for surplus plant, he would consider that the practical exhaustion of a substantial part of the retort capacity might quite fairly be set against some exceptional margin in regard to other portions of the plant. With reference to the surplus land, he should say that it would be quite unusual to exclude from the undertaking as a whole the area which was not actually employed at present for the purposes of the undertaking. The area in question was not more than was reasonably necessary to provide for extensions in the future. He had not considered the question of the value of this land, but had in the ordinary way taken account of the houses. The rentals received from any such property on the fringe of a gas-works, he would put into the revenue account, as they had done themselves. The claim of £2430 that was being made in the present case was certainly not represented by the rents. The consumption of gas for public lighting was over-estimated; and the real percentage of gas unaccounted-for in 1913-14 was over 11, and not just about 9.

Continuing, witness said that apart from the actual figures of receipts and disbursements of the undertaking during the year 1913-14, there were three items in respect of which his advice was specially asked by Mr. Henderson; and an increased figure was inserted in accordance therewith. These were the meters, the cookers, and the allowance for repairs and maintenance. The adoption of 7½d. per 1000 c.ft. of gas for maintenance really in this case represented something less comparatively with other normal undertakings. He thought it was 6·91d. in this particular case, with 11¾ p.ct. leakage. The addition made for maintenance and renewal of stoves and meters accounted for the difference between Mr. Napier's 6d. and his own 7½d. per 1000 c.ft. The net difference between the profit brought out by the two sides, witness said, was really reduced to £283; and this figure would be rather difficult to allocate under any particular heads. The difference arose in regard to three elements—the amounts required for normal and reasonable maintenance, replacement of meters, and replacement of cookers. As to the valuation put in, Mr. Henderson gave a figure of £6096 as representing the capital expenditure upon the undertaking out of revenue during the period from 1908 to 1914. His own investigations, however, showed a rather larger figure. From beginning to end, there was £15,378 of capital in the undertaking which had been provided out of revenue. Mr. Henderson's statement was based upon what the books revealed; and his own, on the difference between his structural valuation and the cash put into the concern.

Mr. CONSTABLE: The figure stated by Mr. Henderson was really £1800 too little, because he omitted to note that, before 1908, £1800 had been issued without cash subscribed. This reduced a good deal the difference between Mr. Henderson and Mr. Herring.

Further questioned, witness said he considered that £1265 was a valid deduction before estimating the profit that could be permanently maintained. One of the earlier figures he ascertained was that the profits amounted to 17d. per 1000 c.ft., which was a very excessive figure as compared with an ordinary statutory company. A figure like this was not maintainable; it would have to come down sooner or later. He agreed with the result shown in Mr. Henderson's valuation; applying a multiplier of twelve years, and bringing out £22,212. The revenue of the undertaking seemed to be marked by exceptional irregularity. Of all the years before and after, 1914 brought out the highest net revenue that was attained. He did not consider that in any circumstances one could take a year as a stable year of profit, when it was found that it represented such a large figure per 1000 c.ft. of gas as this did.

Mr. MONCRIEFF (in cross-examination): Is not the gross revenue of an undertaking a better indication of the stability of the concern than that part of the revenue which is set aside net for profits?

Witness: It must, of course, have some influence upon it.

Your only apprehension of the maintainability of the profit is with regard to the maintainability of the price of gas?—That is true.

If a purchaser had referred to you the question of what price he should pay for the structure, and structure only, you would have advised £32,153? I am putting to you that, not only the structure in this case is changing hands, but the goodwill of an increasing and prosperous business.—We do not take into account goodwill in a gas undertaking.

Do you suggest that because, in addition to the structure, something else which you may or may not be in the habit of taking into account is changing hands, £10,000 should be taken off the value of the structure for purposes of transfer?—That is what the figures come out at. I cannot go further than that.

In the East Wemyss case, Mr. Constable suggested that of the figure there applied to capital expenditure out of revenue, half should be allowed by the tribunal, and half should be disallowed. Are you maintaining that the whole amount should be disallowed?—I am.

As to leakage, do you agree that the normal figure, as tested by the average results in Scotland, works out at between 7 and 8 p.ct.?—No, I do not think it does.

Mr. WOODALL: There has been a considerable increase in unaccounted-for gas in Leven the last few years, rather suggesting that the expenditure on repairs and maintenance of the mains has been somewhat neglected?

Witness: Yes; that is a fair inference to draw.

The OVERSMAN: This is a non-statutory Company, and, with its disadvantages, is allowed to make more than 10 p.ct. Now, instead of dividing the total percentage earned in the shape of profit, it stores it up in the works, as it were. Should it be docked of all the profit it has been making? If so, maintainable profit comes to be merely the dividend that is paid?

Witness: I think if one was dealing with a company which had not divided (say) more than 10 p.ct., one would have to consider the case differently from this.

Mr. WOODALL: You are really dealing with it more on the lines of a statutory undertaking that is limited in dividend?

Witness: That is what the result appears to bring out, because the profit of £1851 represents 8·4d. per 1000 c.ft. for capital charges.

Mr. *Peter Reid*, architect, of the firm of Messrs. Williamson and Reid, put in a valuation of £1245 for the separate land and property.

Counsel then addressed the tribunal upon the claims put forward, which it was recognized must in principle follow much upon the same lines as the East Wemyss case.

Though it will be seen from the now completed report of the two arbitrations that the cases became to some extent linked together, the proceedings were originally started on separate lines. The Arbitrators for the East Wemyss case were Mr. Henry Woodall (for the Council) and Mr. W. Doig Gibb (for the Company); and in the Leven case, Mr. Henry Woodall (for the Council) and Mr. Alexander Yuill (for the Company). Both sets of Arbitrators appointed Lord Ashmore (then Mr. John Wilson, K.C.) as Oversman, and Mr. J. A. Stuart, S.S.C., as their Clerk and Legal Assessor.

Before these appointments were made, East Wemyss had selected Mr. Yuill and Mr. J. W. Napier to be their technical witnesses; while Leven had chosen Mr. Doig Gibb and Mr. Napier. It was the same burgh that was acquiring both undertakings; and, in consequence, at a preliminary meeting of the two courts, it was agreed that the cases should be heard one after the other, without a break. Before the start of the East Wemyss case, the Oversman intimated that he would prefer to hear one technical witness only on each side, and preferably neither of the gentlemen appearing as Arbitrators in one case or the other.

PROTECTING GAS-MAINS FROM ELECTROLYSIS.

Regulations to supersede those hitherto in force have just been made by the Ministry of Transport, in connection with the Tynemouth and District Tramways and Light Railways, for preventing fusion or injurious electrolytic action of, or on, gas or water pipes or other metallic pipes, structures, or substances.

One of the two conductors used for transmitting energy between the generator and the motors shall be in every case insulated from earth; the other may be insulated throughout, or may be uninsulated in such parts and to such extent as is provided in the regulations. When any part of a return is uninsulated, it shall be connected with the negative terminal of the generator; and in such case the negative terminal of the generator shall also be directly connected to two separate earth connections which shall be placed not less than 20 yards apart. The earth connections shall be constructed, laid, and maintained so as to secure electrical contact with the general mass of earth, and so that, if possible, an electro-motive force not exceeding 4 volts shall suffice to produce a current of at least 2 amperes from one earth connection to the other through the earth; and a test shall be made once in every month to ascertain whether this requirement is complied with. Provided that in place of such two earth connections, the Company may make one connection to a main for water supply of not less than 3 in. internal diameter, with the consent of the owner thereof and of the person supplying the water, and provided that where, from the nature of the soil or for other reasons, the Company can show to the satisfaction of the Minister of Transport that the earth connections herein specified cannot be constructed and maintained without undue expense, the provisions of this regulation shall not apply. No portion of either earth connection shall be placed within 6 ft. of any pipe except a main for water supply of not less than 3 in. internal diameter metallically connected to the earth connections with the consents specified.

When the return is partly or entirely uninsulated, the Company shall, in the construction and maintenance of the tramways or railways (*a*) so separate the uninsulated return from the general mass of earth, and from any pipe in the vicinity; (*b*) so connect together the several lengths of rails; (*c*) adopt such means for reducing the difference produced by the current between the potential of the uninsulated return at any one point and the potential of the uninsulated return at any other point; and (*d*) so maintain the efficiency of the earth connections specified in the proceding regulations as to fulfil the following conditions: (i) That the current passing from the earth connections through the indicator to the generator, or through the resistance to the insulated return, shall not at any time exceed either 2 amperes per mile of single tramway line or 5 p.ct. of the total current output of the station. (ii) That if at any time, and at any place, a test be made by connecting a galvanometer or other current indicator to the uninsulated return and to any pipe in the vicinity, it shall always be possible to reverse the direction of any current indicated by interposing a battery of three Leclanché cells connected in series if the direction of the current is from the return to the pipe, or by interposing one Leclanché cell if the direction of the current is from the pipe to the return. The owner of any such pipe may require the Company to permit him at reasonable times and intervals to ascertain by test that the conditions specified in (ii) are complied with as regards his pipe.

When the return is partly or entirely uninsulated, a continuous record shall be kept by the Company of the difference of potential during the working of the tramways between points on the uninsulated return. If at any time such difference of potential between any two

points exceeds the limit of 7 volts, the Company shall take immediate steps to reduce it to below that limit.

Every electrical connection with any pipe shall be so arranged as to admit of easy examination, and shall be tested by the Company at least once in every three months.

The insulation of the line and of the return when insulated, and of all feeders and other conductors, shall be so maintained that the leakage current shall not exceed one-hundredth of an ampere per mile of tramway or railway.

These are only some of the fifteen regulations.

DAMAGE TO BELGIAN GAS-WORKS DURING THE WAR.

The "Journal des Usines à Gaz" published in their Nov. 5 issue an extract from an article on the above subject which appeared in the "Bulletin" of the Belgian Gas Association in May this year.

The works at Liège were the first to suffer. A preliminary bombardment on Aug. 6, 1914, preceded a demand for surrender, which was refused. Thereupon, systematic shelling commenced, directed chiefly upon the factories visible. In one hour the three gasholders were destroyed; and before the capture of the fortress, the mains were broken in many places.

Antwerp's turn came on Oct. 7—the Boches again using the gasholders as targets for shrapnel and high explosives. In view of some forty-five shells having fallen in the works, the damage was comparatively light—only the foremen's lobby and a Livesey washer being completely destroyed, while the mains were broken in only one place. Though gas-making was in full swing when the bombardment started, only two of the workmen were killed.

Menin underwent continuous trouble from aeroplane fights and bombing; and many places in its area of supply have completely disappeared. Langemarcq and Passchendaele were flattened; and their mains have disappeared from the shell-pitted and trench-seamed ground.

In the first bombardment of Ypres, the engineer of the gas-works nearly lost his life from an early arrival—on Nov. 2, after which the work of destruction proceeded steadily. On Nov. 10, the 4000-cb.m. gasholder received a direct hit; and gradually everything above the ground level which could stop a shell was removed. The Nieuport works were reduced possibly to an even greater extent, as they were singled-out as the best observation post in the neighbourhood. The retort-house chimney survived the shelling, only to fall from the shock induced by a French 420-mm. battery in the works!

Louvain was out of the battle zone; but, even so, the gas-works suffered from the effects of Boche pillage and arson. Some 1400 houses were burned. They lost 951 ordinary and 346 prepayment meters; while 250 street lamps were destroyed. This took place on Aug. 25; but by Oct. 8 the wrecked areas were isolated and the consumers elsewhere receiving a normal supply.

The above are but a few instances of the damage throughout the country, which is estimated at 34 million francs (1914). Add to this 13¾ millions of requisitions by the enemy on the gas-works of the country, and one can realize an escape from worse troubles than the price and quality of coal.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Nov.* 22.

The London tar products market maintains an unaltered tone. Makers are busy with shipments of pitch, the price of which is about 225s. net per ton. Creosote is quoted at 1s. 4½d. per gallon; and other products are as previously reported. Sulphate of ammonia remains unchanged.

Tar Products in the Provinces.

Nov. 22.

The average values for gas-works' products during the week were: Gas-works coal tar, 125s. 6d. to 130s. 6d. Pitch, East Coast, 207s. 6d. to 210s. per ton f.a.s.; West Coast—Manchester, 195s. to 205s.; Liverpool, 195s. to 205s.; Clyde, 200s. to 210s. nominal. Benzole 90 p.ct. North, 3s. 1d. to 3s. 2d.; crude 65 p.ct. at 120° C., 2s. 3d. to 2s. 5d. naked at makers' works; 50-90 p.ct. naked, North, 3s. 2d. to 3s. 3d. Toluol, naked, North, 3s. 1½d. to 3s. 2½d. nominal. Coal tar crude naphtha in bulk, North, 1s. 2d. to 1s. 3d. Solvent naphtha, naked, North, 3s. to 3s. 2d. Heavy naphtha, North, 3s. 1d. to 3s. 3d. Creosote, in bulk, North, liquid, 1s. 0⅝d. to 1s. 1⅜d.; salty, 1s. to 1s. 1d. Heavy oils, in bulk, North, 1s. 1d. to 1s. 2d. Carbolic acid, 60 p.ct., 2s. 7½d. to 2s. 9d. Naphthalene, £37 10s. to £40; salts, £10 to £10 10s., bags included. Anthracene, "A" quality, 1s. per minimum 40 p.ct.; "B" quality, nominal.

FROM A MARKET CORRESPONDENT.

Tar Products.

The market is very quiet; and while there is no particular movement in values, the demand has fallen away somewhat. It is possible that buyers are becoming afraid of quotations in view of the beginnings of a slump in other directions, and the impossibility of knowing where it may stop. Pitch is not so strong; and a downward movement in values is looked for. There is not nearly so much confidence about the future as prevailed a few weeks back. Makers, however, are behindhand in their deliveries, in consequence of the recent strike; and this may strengthen their hands. There is no life in solvent naphtha, and heavy is without change. Creosote remains very strong in sympathy with liquid fuel generally. Cresylic acid is just firm; but carbolic acid is a very flat market, although there is but little offering at the moment. Crystals are practically unsaleable, and one hardly cares to mention the lowest prices heard of. Other products are to all intents and purposes without change.

Latest values are as follows:

Benzole: 90% London 4s. 1d., North 3s. 10d. to 3s. 11d.; 50-90% 3s. 6d. London, 3s. 3d. to 3s. 4d. North; crude 60-65%, 2s. 5d. to 2s. 7d.; pure, 4s. 3d. per gallon naked.

Crude Tar: London, 105s. to 115s.; Midlands, 107s. 6d. to 117s. 6d.; North, 105s. to 115s. per ton *ex* works. Refined tar, 95s. per barrel (free) on rail.

Pitch: London, 222s. 6d. per ton f.o.b.; East Coast, 220s. per ton; West Coast, 210s., with Manchester 220s. per ton, and Glasgow 215s. per ton; South Wales, 230s. per ton.

Solvent Naphtha: London, 3s. 2d.; Provinces average 3s. 1d. per gallon.

Crude Naphtha: Naked, 1s. 1d. to 1s. 2d.; North, 1s. per gallon.

Heavy Naphtha: 3s. 4d. per gallon.

Naphthalene: Refined flake, £60 per ton nominal; inferior, £35; crude, £17 to £28 per ton, according to quality.

Toluol: Naked, 3s. 4d. per gallon nominal; North, 3s. 2d.; pure, 4s.

Creosote: London, 1s. 3d. to 1s. 4¼d.; North, 1s. 3¼d.; heavy oil, 11½d. per gallon in bulk.

Anthracene: 40-45%, 1s. 4d. to 1s. 6d. per unit per cwt.

Grease Oils: 18° Tw. (naked), £6 10s. per ton f.o.r. makers' works.

Pyridine: 20s. to 25s. per gallon.

Aniline Oil: 1s. 8d. per lb., drums extra.

Aniline Salts: 1s. 10d. per lb.

Cresylic Acid: Crude, 3s. 9d.; 95%, 4s. 3d. to 4s. 9d.; 97-99% 4s. 9d. to 5s. 3d.; pure 6s. per gallon *ex* works London, f.o.b. other ports.

Carbolic Acid: Crude 60%, 3s. 9d. per gallon; crystals 40%, 8d. per lb. nominal.

Salicylic Acid: Technical, 2s. 4d.; B.P., 3s. per lb.

Xylol: Pure, 5s. 6d.; commercial, 4s. 9d. per gallon.

Resorcin: 12s. to 13s. per lb.

Alizarine 20%: 2s. per lb.

B. Naphthol: 3s. per lb.

Sulphate of Ammonia.

No immediate improvement is expected in this market, and business continues on the quiet side. The amount of injury done to production by the coal strike is not known, but that it will probably lead to a reduced production on the year is likely, unless miners and owners set to work more vigorously than ever before to make good the loss by a further increase in output now. New business for delivery over the first quarter of next year is not so heavy as anticipated, and the probability is that greater quantities will be available for shipment abroad. Foreign demand appears to be slackening, because the October export for sulphate was 10,309 tons, as compared with 13,250 tons in September. Furthermore, the October figure compares with an export in October last year of 13,596 tons. The total export for the ten months of this year was 86,427 tons, comparing with 69,914 tons in the corresponding period of last year. The most active buyers of our sulphate of ammonia now are the Dutch East Indies, Spain, and the Canaries. The prices offered for export are not so firm. Advices from America are to the effect that there has been a lack of any pronounced demand for sulphate of ammonia, either for domestic consumption or export purposes. A better feeling, however, is declared to be prevailing.

Newcastle Gas Company's Ex-Service Employees.

Over 600 ex-service employees of the Newcastle and Gateshead Gas Company were entertained at dinner by the Chairman and Directors, at St. George's Drill Hall, Newcastle, last Friday night. Mr. John E. Cowen presided, and proposed the Loyal Toasts, following which the "Last Post" was sounded. The Chairman then, on behalf of the Directors of the Company, thanked those present for the part they had played during the war. Referring to the roll of honour, he remarked that some 40 p.ct. of their average total staff of 1760 had served with the Colours, and ninety laid down their lives. Thirty had gained distinctions. He also mentioned the work done by the various committees for relieving distress among the dependants of employees. For this purpose, £5300 had been collected. The late Mr. T. Waddom had rendered great assistance in organizing these committees; and he regretted exceedingly that that gentleman could not be with them on the occasion of this re-union. All credit also was due to the officials and workers who had carried on in the absence of their comrades. In spite of depleted staffs, consumers had been provided with their usual supplies, and gas for munition purposes had been available. In the case of their principal consumers, Messrs. Armstrong, Whitworth, & Co., the supply had been increased by 350 p.ct. during the war. All promises made to ex-service men had been fulfilled. He proposed the toast of "The Gallant Dead." Responding, Colonel Ritson said it was a pleasure to be among men who had shown such a fine fighting spirit. He had always had confidence in the gallant spirit of Englishmen. This spirit was going to carry the country through in the future.

Association of Statutory Inspectors of Gas-Meters.—The Executive Council of the Association of Statutory Inspectors of Gas-Meters will meet in the Board Room at the Gas-Meter Testing Station, London Road, Manchester, to-morrow [Thursday], at 10.30. The President of the Association (Mr. J. Ollis, Chief Officer of the Control Department of the London County Council), and members of the Council and of authorities administering the Sale of Gas Acts, will be received by the Chairman (Mr. H. N. Barrow) and members of the City Justices Committee, and proceed to inspect the meter-testing station. The visitors will afterwards be entertained at lunch by invitation of the Lord Mayor (Alderman Kay).

Fatal Fall from a Coal-Hopper.

An inquest was held on Tuesday last week, by the Deputy-Coroner (Mr. P. Byrne), concerning the death of a gas worker named William Brown, who met with a fatal accident at the works of the Wandsworth, Wimbledon, and Epsom District Gas Company. Mr. R. H. Buxton, Mechanical Superintendent at the works, said one of the duties of the deceased was to fill the hopper of the charging machine from the overhead coal-hopper, for which purpose he had to unscrew a wheel slide-valve. He would have to be on the charging machine, reaching his position by means of stairs and a gangway. The staircases and gangway were provided with iron bars for protection. Having arrived there, he would sit on a plank. When he was sitting on this plank he would not be visible to anyone driving the machine below. The plank was stretched across the top of the machine hopper, underneath the wheel which he was to operate. Supposing a man was standing on this plank, there was no protection, except by holding on to the wheel, to prevent him over-balancing and falling. Had a protection been provided, it would come very near the wheel. The man should not be standing on the plank, but sitting, when he would not be in danger. There was no means of communication, except by shouting, between the driver and the man on top. The machine had been in use ten years; and the slide-wheel had been in its present position four years. He had never known an accident with it before. John Hill, a labourer, said he was in the retort-house conveying a load; and the machine was in his way. He asked the driver to move the machine a little; and as this was being done, deceased fell down. The driver stated that he did not know his mate had reached the top, and moved the machine two or three inches. He did not shout out before doing so. The Coroner said they must feel considerable sympathy with the driver, who had not been guilty of criminal negligence, but merely forgetfulness in not giving any warning that he was about to move the machine. If it was a regulation on the part of the Company that there should be a warning shout or noise made before the machine was moved, this regulation ought to be fixed in a prominent place in the retort-house, or in some other way brought to the notice of the men in such a manner that there could be no doubt about it. Having returned a verdict that the deceased came by his death by misadventure, the Coroner added the following rider: "And the attention of the Company should be drawn to the fact that it it would be highly desirable to consider whether some practical means cannot be found of operating the slide-valve wheel of the fixed hopper without the necessity of a man having to ascend the charging machine.

Lanark Gas Supply.—The Gas Committee have the question of improving the supply before them. It is stated that all the new retorts will be completed and working in the course of a fortnight, and that the gas supply will then be improved. As to the hire of gas-cookers, a rent is to be charged that will be equivalent to 5 p.ct. on their cost.

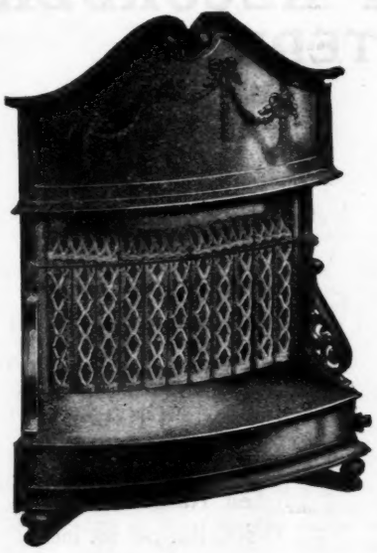
Public Lamps and Gas Waste in Philadelphia.

According to the Bureau of Street Lighting, the average working period of the Philadelphia street gas-lights is eleven hours in each twenty-four. Of this period, they are needed only nine hours, the remainder of the time being wasted while the lamplighters make their rounds. As there are 25,500 gas street-lamps in the city, each is burning 14,400 c.ft. of gas in a year, with gas costing the United Gas Improvement Company $1 per 1000 c.ft., the annual cost for gas of lighting the city works-out at $367,200, of which two-elevenths, or $66,763, is represented by waste. In an interview reported in the "American Gas Engineering Journal," Mr. Samuel T. Bodine, the President of the United Gas Improvement Company, said the lamplighter is affected by labour unrest, just as is any other workman. There is no way that his Company know of by which the waste of gas in the early morning and evening can be eliminated, except by an increase in the number of lamplighters, which would mean the paying-out of more wages. The Company once considered the installation of clockwork lighters and extinguishers; but it was felt that, under existing conditions, the first cost would be prohibitive, apart from the question of the pilot-light. Mr. Bodine understands that Charleston has a system whereby it starts to turn-on the lights at dark, and begins extinguishing them before dawn; but this system could not be used in Philadelphia, "as the sections left in darkness would furnish a paradise for criminals."

Spenborough Gas Scheme.—The Spenborough District Council are promoting a Bill for the acquisition of the Gomersal Gas Company and the Heckmondwike and Liversedge Gas Company. Considerable progress towards this end has already been made. The consumers in the Gomersal and Liversedge areas are paying more for their gas than those in the Spenborough district; and the effect of the Bill will be to unify the charges.

Cost of Installing Gas-Cookers under Housing Schemes.—At a meeting of Arbroath Gas Committee, it was intimated that the Board of Health cannot allow the cost of installing gas-cookers into the houses being erected under the local housing scheme, to be charged against the housing subsidy; and it was agreed by the Committee to recommend to the Council that the Gas Department instal the necessary cookers at their own expense.

Lurgan Gas Undertaking.—At a meeting of Lurgan Urban Council, the report of the auditor was read, showing a gross profit on the operations of the gas-works of £15,085 for the year ended March 31 last, as against £11,021 for the previous year, and stating that the net loss for the year, after deducting charges against revenue, was £1306, as against £1927 for the previous year. The Clerk said he had written to the makers of certain meters in England to send an inspector over to see how those in Lurgan were working, and had received a reply to the effect that they could not persuade any of their staff to visit Ireland, owing to the conditions prevailing there.



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Another Woodall-Duckham Installation for Nechells.

The City of Birmingham Gas Department have accepted the tender of the Woodall-Duckham Vertical Retort and Oven Construction Company (1920), Ltd., for the erection of four beds of vertical retorts, complete with all auxiliary coal and coke-handling machinery, at their Nechells works. The plant will have a carbonizing capacity of 840 tons of coal per day, containing in all 120 retorts. This is the third installation to be erected on the Woodall-Duckham system of continuous vertical retorts at Nechells, and the seventh constructed on this system for the Birmingham Gas Department.

Coal Prices for Metallurgical Coke.—Some days ago, a deputation representing the National Association of Coke-Owners waited on Mr. Bridgeman with reference to a recent direction of the Board of Trade compelling metallurgical coke manufacturers to pay the export price for coal used in the making of coke shipped to foreign destinations. It was pointed out that hitherto coal had always been supplied to coke-makers, as to other manufacturers, at the inland limitation prices, and that therefore the recent direction compelling coke-makers to pay the export prices on all coal used in the manufacture of export coke was an unfair discrimination against one particular industry. Other industries were receiving all their coal at inland prices, and coke-owners claimed that they were entitled to the same privilege. The deputation were informed that the direction of the Coal Controller could not be altered; and it was arranged that the coke-makers should confer with the coal-owners with a view to an agreement between them on the subject.

Newry Gas Undertaking Loss.—In a report on his audit of the Newry Urban Council Gas-Works accounts, the Irish Local Government Board Auditor stated that the profit and loss account closed on March 31 last with a loss of £548, as compared with a profit the previous year of £609. This loss had been occasioned by the Committee's failure to increase the price of gas and residuals as the cost of manufacture rose from time to time. The Committee were reminded that they had no reserve fund, though they had parliamentary sanction to create one; and it would be necessary at the next audit to show that all proper steps had been taken to make good the loss, which otherwise might become chargeable under the Local Government (Ireland) Act, 1902. Mr. P. M'Caffrey (the Chairman of the Gas Committee), in a letter on the report, said the working results compared favourably with those of other towns of about the same size. Large sums had been laid out on the works; and these had all been paid out of earnings. Losses on gas enterprise had occurred in Belfast and in many English concerns. The working expenses in Newry had, of course, jumped up since 1914; and a rise of £3679 incurred in 1920 over 1919 was made up of wages' increase £1283, and extra cost of coals £2082. These charges were inevitable; and as the ratepayers had had cheap gas and coke last year, they should not grumble if they had to pay a little more this year to meet extra expenses.

Gas from a Colliery for Pontypridd.—It was reported to a recent meeting of the Pontypridd Urban District Council that new mains to the Maritime Colliery of the Great Western Railway Company for an augmented supply were now nearly completed; but that the works of the Company would not be ready for another few weeks, consequent upon delay in the delivery of machinery. It was decided to ask the consumers to bear patiently with the Council, who were doing everything possible to improve the supply at the earliest possible moment.

Benzole and Bye-Products, Ltd.—The Directors have decided to adopt as the financial year of the Company the twelve months ending Aug. 31. The accounts for the seven months to Aug. 31 last are in course of preparation; and indications of the profits for this period are very satisfactory. The profits of both the Crigglestone Bye-Products Works and the Mitcham Refinery are good. Altogether, for the seven months' trading, the results are likely to be considerably in excess of the amount needed to pay the preference dividend for the full year. Current trading shows a gratifying progressive increase.

Batley Corporation Accounts.—The abstract of accounts of the Batley Corporation for the twelve months ended March 31 shows that there was a loss on the year's working of both the gas and electricity departments. The loss on the gas undertaking was £6438, bringing the total net deficiency on the undertaking to £7618, though on the actual working of the past year there was a gross profit of £4526. The situation in the electricity department is the same, except that the figures are rather less. This has been the second year of loss on the gas accounts; whereas there has been a loss for four previous years in the electricity department. For five years prior to that just reported on there was an average of something like £4000 paid from gas profits in aid of the rates.

The Fatality at Saltley.—A verdict of "Accidental death" was returned at a Birmingham inquest on the body of George Thorne, a gas-works labourer at Birmingham, who died from injuries received while following his employment. Mr. Carrington Barber, the Works Engineer at Saltley, stated that Thorne's duties were to keep the track of a quenching machine clear of rubbish. The machine travelled backwards and forwards on a rail-track. Parallel with the track there was an alley for men to walk in; there being a 2-ft. wall between the track and the alley. The machine travelled at a rate of 3 to 4 miles an hour, stopping frequently at the furnaces. When the machine was going to move, the driver rang a bell; and anybody at work on the track was supposed to get into the alley. Robert Hale said he saw Thorne pick up his shovel and put it over the wall to scrape some rubbish from the plate over the wheel of the machine. The driver rang his bell, and the machine started to move; but the shovel seemed to be fastened. Thorne let the shovel go with the left hand, but held to it with the right; and the framework of the machine seemed to take hold of Thorne, who was drawn over the wall on to the track. The Coroner (Mr. J. Bradley) expressed the view that the arrangements for the prevention of such an occurrence were reasonably safe; and he found no reason to make any other comment.

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MAKERS:

ALEXANDER WRIGHT & Co., Ltd., WESTMINSTER

Chesterfield and the Whittington Gas-Works.—The Chesterfield Town Council have decided to ask the Ministry of Health to sanction the borrowing of £55,000 for the purchase of the Whittington Gas Company's undertaking. The Mayor (Alderman W. H. Edmunds) explained that it was a non-statutory Company supplying gas within the added area of the new borough of Chesterfield, and also at Brimington. They felt it was expedient that they should secure the undertaking, so that the Corporation would have the entire responsibility and control of the gas supply in their new area. They made an offer of £43,000; but the Company wanted £80,295. Following an interview, the Board made a final offer of £51,000, which was ultimately accepted. Other expenses were incurred in coupling-up the mains, &c. The output from the Whittington works was 45 million c.ft. It was an up-to-date little concern, and would become a very valuable asset to the Corporation.

Loan Inquiry at Stoke-on-Trent.—The Stoke-on-Trent Corporation having applied to the Ministry of Health for sanction to borrow £15,000, a local inquiry was held on Nov. 10, by Mr. R. C. Fox, on behalf of the Ministry. Mr. G. C. V. Cant (Deputy Town Clerk) explained that the money was required for a high-pressure gas supply for Weston Coyney and Blythe Bridge, which would involve a cost of £12,000; and the remaining £3000 was needed for the provision of a coal conveyor plant at the Longton gas-works. The first expenditure was necessary on account of the difficulty of giving a supply to Lightwood, Meir, and Blythe Bridge. At the Meir, the Stoke-on-Trent Corporation and the Cheadle Rural Council had each a housing site, where gas would be required. The present mains were quite inadequate to deal with any increased supply which might be necessary. Replying to the Inspector, Mr. Cant stated that the Housing Commissioner had guaranteed payment to the Gas Committee of a reasonable percentage per annum of the cost of laying the mains, to supply gas to their housing sites; but no definite figure had been fixed.

Gas Explosion in Manchester.—By a gas explosion at about 1 o'clock last Sunday week, in Ridgway Street, Bradford Road, Manchester, the fronts of two houses and the interiors were partially wrecked and adjoining premises damaged; while persons residing in the two houses were more or less seriously injured. There had been a strong smell of gas in the early morning; and the explosion happened when a fire was being lighted by a man, who was blown against a window, and taken to the infirmary suffering from a broken ankle. A child was taken to the workhouse, where it was found that her leg had been fractured. The other injured persons suffered from cuts, bruises, and shock. Mr. William Newbigging (Consulting Engineer to the Gas Department) points out that the district in which the explosion occurred, owing to colliery workings, has been subsiding for many years. The fracture was in the socket of a 3-in. main. In this case, the leakage had actually been reported, and Corporation workmen were on their way to the scene when the explosion happened. The leaking gas had probably travelled from the cracked main along the service-pipe until it found an outlet at the fireplace.

Unlighted Streets at Dunmow.—Following upon a refusal by the ratepayers to pay an extra sum for lighting, the streets of Dunmow remain in darkness. When the Gas Company announced that the cost of winter street lighting would have to be slightly increased, a meeting was held to decide whether to incur an extra farthing rate, or do without street lighting during this winter. The latter course was taken; and for nearly a month the town has been in darkness. Several accidents have occurred; and, as a result, steps are to be taken to revoke the ratepayers' decision, and accept the Company's increased price.

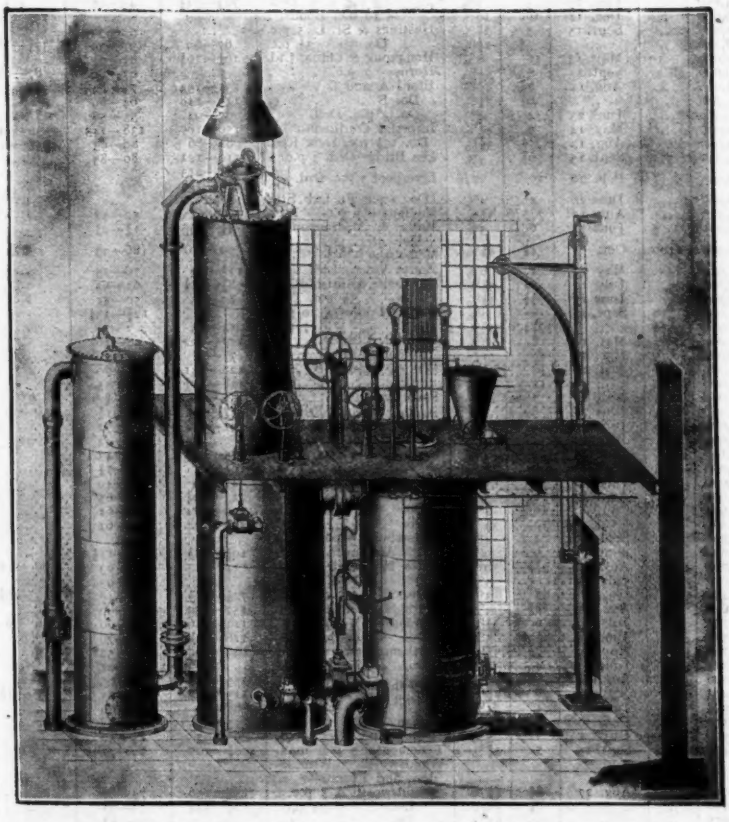
APPLICATIONS FOR PATENTS.

[Extracted from the "Official List" for Nov. 17.]

Nos. 31,464 to 32,147.

BAMBER, H. W.—"Gas-scrubbers." No. 32,120.
BOOTY, P. C. P.—"Devices for controlling valves, &c." No. 31,802.
CHANDLER, F. D.—"Tap with device to prevent it being turned on or off." No. 31,497.
DAVIDSON, P. G.—"Means for obtaining a force varying with the density of a gas." No. 31,643.
GEORGE, W. J.—"Bunsen burners." No. 31,878.
GINGER, H.—"Gas-burners for lighting." No. 31,602.
KELLY, J.—"Incandescent gas-burner." No. 31,487.
KUX, O. C. R. W.—See Ginger. No. 31,602.
MAWSON, J.—"Gas-producers." No. 31,934.
PALLAS-ZENITH GAS.—"Combustible fuel-feed with meter for measurement of fuel supplied." No. 31,577.
PARKER, J. W.—See Bamber. No. 32,120.
PIANA, V.—"Apparatus for carbonization by gas of woollen rags, combings, &c." No. 32,075.
ROBUS, A. J.—"Apparatus for distillation of peat and recovery of products." No. 31,470.
STEWART, J. G.—"Means for varying flow of gas with changes in atmospheric density." No. 31,642.
TECHNO-CHEMICAL LABORATORIES, LTD.—"Recovery of heat from treated material." No. 32,127.
UMPLEBY, F.—"Gas-light fittings." No. 31,607.
WELLS, J. F.—"Gas-producers." No. 31,788.

The Accrington Gas Board have decided to apply for sanction to borrow £9380 for the erection of new framing and supports for the large gasholder at Great Harwood. Notwithstanding the restrictions during the coal strike, the financial results during the last six months have been a record. The Board have sold 27 million c.ft. more gas than during the corresponding six months last year.



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BLUE AND
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The Directors of the Churnet Valley Gas Company, Ltd., report a sum available for distribution of £1557; and a dividend is recommended of 6½ p.ct., less tax, with a carry-forward of £682.

The Wirksworth Magistrate bound over Henry Higton, a gas stoker, under the First Offenders' Act, on a charge of stealing sixpennyworth of coal from the local gas-works where he was employed. A constable met him coming from the works with two lumps of coal under his coat. He pleaded that he was short of coal through the strike, and quite intended to pay for what he took.

For the second evening in succession, the Plymouth electricity supply failed in several districts last Thursday. On both occasions the failure occurred just at the time when the light comes into greatest demand, and considerable inconvenience naturally resulted. Several picture palaces—those, of course, that had not provided themselves with the means of generating their own current—were unable to continue for a while. Each time the current was on again after about half-an-hour's delay.

Clayton West consumers have had their supply of gas considerably curtailed, in consequence of defects in the purifying plant at the works—one vessel recently completely collapsing. The installing of new purifiers is being pushed forward as rapidly as possible.

Messrs. J. H. Sankey & Son, Ltd., fire-brick specialists and manufacturers, of Essex Wharf, Canning Town, E., forward a useful list of temperatures, showing the melting point, disassociation point, boiling-point, or freezing point of various substances, with means of forming a rough estimate of temperatures by colour.

Messrs. A. & W. Richards, of No. 37, Walbrook, E.C., are offering, by instruction of the Directors, an issue at par of £25,000 of 7 p.ct. debenture stock in the Watford Gas and Coke Company, to be redeemed at par on Dec. 31, 1930. The business of the Company is rapidly expanding. The quantity of gas sold in 1913 was 291 million c.ft., and in 1919 416 millions; while for the first half of the current year the output showed a still further increase. Offers are to be sent in by Monday, Dec. 6.

STOCK MARKET REPORT.

THE week just closed on the Stock Exchange was even less satisfactory than its predecessor. The prime cause was still the weak exchanges and Continental pressure to sell; the latter being, moreover, supplemented by the addition of home liquidations. The opening was dull, and the gloom increased day by day until by Friday stagnation point was almost reached.

Home Government issues moved irregularly from time to time; but all closed lower. Friday's figures were as follows: Consols 44¼-44⅛, War Loan 82⅛-83⅛, Funding 67⅞-67⅛, Victory 73½-73⅞. Bonds were easier, and Corporation issues gave way. Indians were marked lower. Home Rails ordinaries were down; but there was some inquiry for prior charges. Canadians and Argentines were lower.

The Foreign Market went very heavily, and the fall was more or less general throughout, though the last prices were not the worst.

In the Miscellaneous, it needed some seeking to find a line that had not suffered from the pressure to sell.

Business in the Gas Market was about on a par as regards activity with the preceding week; and again several of the minor and less conspicuous undertakings were dealt in. The market appeared to be affected to some extent by the contagious weakness which was depressing all departments more or less, and thus some quotations were put down. In the London Companies, Gas Light ordinary was 2 lower, and South Metropolitan ordinary 1 lower; but Commercial was unchanged. In Suburban and Provincial, South Suburban ordinary and Sheffield "A" were each 2 lower. In Continentals, Imperial had a recovery and closed 5 higher; but European had a slight fall. Primitiva preference fell ¼.

Bargains done for cash during the week were as follows: On Monday, Croydon "A" 131, European 6½, Gas Light ordinary 55, 55⅛, 55⅛, Imperial Continental 135, 135⅛, 136, 136⅛, 137, 137⅛, Primitiva debenture (1911) 38, South Metropolitan 62⅛, ditto debenture 46, South Suburban 56, 57, Tottenham "B" 51, 51⅛, 51½. On Tuesday, Bombay 4¼, Brentford "A" 53½, 54, ditto preference 69, British 21, 21⅛, Commercial 4 p.ct. 55⅛, 56, Croydon "A" 130, ditto "B" and "C" 91⅛, 92, European 6⅛, Gas Light ordinary 54⅛, 54⅜, 55, 55⅛, ditto 10 p.ct. Bonds 132, 133, Imperial Continental 137, 137⅛, 138, 138⅛, 139, South Metropolitan 61⅛, 62½, South Suburban 58. On Wednesday, Brentford preference 70, Commercial 4 p.ct. 55, ditto 3½ p.ct. 48, ditto debenture 45½, Croydon "A" 131, Gas Light ordinary 54⅛, 54⅛, 54⅜, ditto maximum 37⅛, ditto preference 57⅛, ditto debenture 46⅛, Hornsey "A" 119¼, ditto 7 p.ct. 87, 87⅛, Imperial Continental 138⅛, 139⅛, 140, 140⅛, 140½, 141, 141⅛, South Metropolitan 61, 61⅛, South Suburban 57⅜, ditto debenture 68, Tottenham "A" 62, Richmond debenture 59, 59⅛. On Thursday, Cape Town preference 5⅛, European 6½, Gas Light ordinary 54⅜, 55, ditto maximum 39, ditto preference 57, 58, Imperial Continental 140, 141, 142, ditto debenture 91⅜, 92, 92⅛, Primitiva preference 21s., Richmond 5 p.ct. ordinary 58, Ryde 5 p.ct. ordinary 57. On Friday, Croydon "A" 131, European 6½, Gas Light ordinary 53⅛, 54, ditto maximum 37, Hastings and St. Leonards 3½ p.ct. 37⅜, 38⅛, Imperial Continental 138, 139, 139⅛, 140, 140⅛, ditto debenture 72, Metropolitan of Melbourne, 90⅛, Primitiva 9s. 6d., ditto preference 20s., 21s., South Metropolitan 60, 60⅛, ditto debenture 46⅛.

In the Money Market, available supplies proved equal to meeting the moderate demand, rates eased, and then continued steady. Discount terms were also easy. Silver was quiet and fell as low as 49d. The Bank rate is 7 p.ct., fixed on April 17 last.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices, July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
£			p.c.					
182,049	Stk.	Aug. 27	4	4%	Aldershot 4 p.c. Pref.	...	56—61	...
1,551,868	,,	Oct. 14	2½	3⅛%	Alliance & Dublin Ord.	59—64	36—41	...
374,000	,,	July 14	4	4%	Do. 4 p.c. Deb.	76—79	47—52	...
280,000	5	Oct. 28	7½	8%	Bombay, Ltd.	5¼—6¼	4¼—4¾	4¼
100,000	5	Aug. 12	16	5%	Bourne- 5 p.c.	...	8—9	...
383,110	10	,,	7	7%	mouth Gas B 7 p.c.	15—15½	8½—9½	...
115,000	10	,,	6	6/-	and Water Pref. 6 p.c.	13½—14	7½—8½	...
162,065	—	June 25	—	4%	4 p.c. Deb.	...	62—64	...
992,045	Stk.	July 14	14	30/-	Brentford A Consolid.	261—266	50—55	53½—54
734,920	,,	,,	11	26/3	Do. B New	204—209	47—52	...
35,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	68—73	69—70
221,400	,,	June 10	4	4%	Do. 4 p.c. Deb.	91—93	60—63	...
214,775	,,	Aug. 27	11	7½%	Brighton & Hove Orig.	208—213	120—125	...
244,200	,,	,,	8	5½%	Do. A Ord. Stk.	154—159	78—83	...
1,287,500	Stk.	July 29	5	5%	Bristol 5 p.c. max.	...	...	...
530,000	20	Sept. 15	12½	10%	British	44—45	20—22	21—21½
120,000	Stk.	June 25	4	4%	Do. 4 p.c. Deb. Stk.	88—90	57—59	...
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	39—42	...
100,000	10	May 27	—	—	Cape Town & Dis., Ltd.	1½—2½	7—7½	...
100,000	10	,,	—	4½%	Do. 4½ p.c. Pref.	4—6	5½—6½	5½
100,000	Stk.	June 25	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	56—61	...
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	...	...
1,513,280	,,	Aug. 12	5/9/4	30/-	Commercial 4 p.c. Stk.	106—108	54—59	55—56
560,000	,,	,,	5½	26/3	Do. 3½ p.c. do.	103—105	47—52	48
475,000	,,	June 10	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	45—47	45½
800,000	,,	Dec. 11	4	—	Continental Union Ltd.	76—79	25—30	...
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	40—50	...
51,600	,,	Aug. 27	14½	10½%	Croydon A 10 p.c.	...	125—135	130—131
278,400	—	,,	11½	7⅞%	Croydon B and C 7 p.c.	..	85—95	91½—92
492,270	Stk.	—	6	5%	Derby Con. Stk.	123—125	...	...
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	...	...
1,008,180	10	Jan. 29	10	5/0	European, Ltd.	17½—18	6—7	6½—6⅝
16,298,975	Stk.	July 29	4/17/4	30/-	Gas 4 p.c. Ord.	98—102	53—56	53⅛—55½
2,600,000	,,	,,	3½	26/3	Light 3½ p.c. max.	76—79	38—41	37⅛—39
4,062,235	,,	,,	4	4%	and 4 p.c. Con. Pref.	96—99	55—58	57—58
4,674,850	,,	June 25	3	3%	Coke 3 p.c. Con. Deb.	72½—74½	45—48	46½
130,000	,,	Dec. 11	10	10%	10 p.c. Bonds.	...	...	132—133
82,500	,,	Sept. 15	5	3⅛%	Hastings & St. L. 5 p.c.	...	53—58	...
258,740	,,	,,	3½	2⅛%	Do. 3½ p.c.	87—89	37—39	37⅛—38½
70,000	10	May 13	11	8%	Hongkong & China, Ltd.	16½—16¾	8½—9½	...
86,600	Stk.	Sept. 15	9	5⅝%	Hornsey 7 p.c.	...	87—89	87—87½
131,000	,,	Aug. 12	7½	4⅝%	Ilford A and C	151—154	79—84	...
65,780	,,	,,	6½	3⅛%	Do. B	115—118	64—69	...
65,500	,,	June 25	4	4%	Do. 4 p.c. Deb.	92—94	55—58	...
4,940,000	,,	May 14	9	4½%	Imperial Continental	150—160	138—143	135—142
1,235,000	,,	Aug. 12	3½	3⅛%	Do. 3½ p.c. Deb. Red.	84—86	89—93	91½—92½
235,242	,,	Sept. 15	6½	5%	Lea Bridge Ord. 5 p.c.	119—121	80—85	...
2,498,905	,,	Feb. 26	10	37/6	Liverpool 5 p.c. Ord. A.	211—213	...	...
					B.	146—148		...
396,083	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	...	...	...
165,736	,,	Aug. 12	7/5/6	3⅛%	Maidstone 5 p.c.	...	52—57	...
75,000	5	June 11	6	3%	Malta & Mediterranean	4¼—4½	1¾—2¼	...
250,000	100	Oct. 1	4½	4½%	Met. of Melbourne 4½ p.c. Deb.	99—101	86—93	90½
541,920	Stk.	May 27	4	6%	Monte Video, Ltd.	11½—12	70—75	...
1,875,892	,,	July 29	4½	3⅛%	Newcastle & Gatsh'dCon.	98½—99½	61—63	...
529,705	,,	June 25	3½	3⅛%	Do. 3½ p.c. Deb.	82—83	50—51	...
15,000	10	Sept. 15	—	3⅛%	North Middlesex 10 p.c.	...	12½—13½	...
55,940	10	,,	7/14/0	3⅛%	,, ,, 7 p.c.	14—15	7—7½	...
300,000	Stk.	May 13	8	8%	Oriental, Ltd.	117—122	98—101	...
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—7¾	2—3	...
60,000	50	Aug. 27	13	7½%	Portsea Island, B	128—131	65—70	...
100,000	50	,,	12	6½%	Do. C	118—121	50—55	...
249,980	5	April 29	8	—	Primitiva Ord.	5½—6	⅛—⅜	9/6
499,960	5	June 26	5	—	Do. 5 p.c. Pref.	4⅛—5	⅛—1½	20/—21/-
521,600	100	June 1	4	4%	Do. 4 p.c. Deb.	91—93	69—71	...
600,000	Stk.	July 29	4	4%	Do. ,, ,, 1911	...	40—42	38
346,198	,,	June 25	4	4%	River Plate 4 p.c. Deb.	85—87	38—43	...
150,000	10	Sept. 30	6	6/-	San Paulo 6 p.c. Pref.	10½—11	6½—7½	...
123,000	50	July 2	5	5%	5 p.c. Deb.	47—49	38—40	...
155,000	Stk.	Aug. 27	10	5%	Sheffield A	223—224	61—65	...
209,984	,,	,,	10	4%	Do. B	222—224	59—61	...
523,500	,,	,,	10	3⅛%	Do. C	220—222	59—61	...
133,201	Stk.	Sept. 15	4	4%	Shrewsbury 5 p.c.	...	...	...
90,000	10	Sept. 30	9	9%	South African	10½—11½	10½—11½	...
6,609,895	Stk.	Aug. 12	5/4/0	30/-	South Met. Ord.	111—113	60—63	60—62½
250,000	,,	July 14	—	5%	Do. Red. Pref.	...	91—93	...
1,895,445	,,	,,	3	3%	Do. 3 p.c. Deb.	72½—74½	45—48	46—46½
224,820	,,	Aug. 27	8½	3%	South Shields Con. Stk.	157—159	95—96	...
1,087,795	,,	July 29	6	3⅛%	S'th Suburb'n Ord. 5 p.c.	114—116	55—60	56—58
247,558	,,	June 25	5	5%	Do. 5 p.c. Deb. Stk.	116—118	65—70	68
647,740	,,	Nov. 12	7½	3⅛%	Southampton Ord.	99—102	55—58*	...
121,275	,,	June 25	4	4%	Do. 4 p.c. Deb. Stk.	...	59—61	...
120,000	,,	Aug. 12	—	3⅛%	Tottenham A 5 p.c.	135—138	60—65	62
782,275	,,	,,	6	2⅛%	District B 3½ p.c.	115—117	50—55	51—51½
181,255	,,	June 10	4	4%	4 p.c. Deb.	87—89	57—60	...
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	...
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	45—50	...
236,476	Stk.	Sept. 15	5	3⅛%	Tynemouth 5 p.c. max.	108½—109	69—71	...
					Wandsworth, Wimbledon, and Epsom—			
30,000	,,	Aug. 27	8½	47/6	Wandsworth A 5 p.c.	151—156	75—80	...
255,636	,,	,,	6½	32/6	Do. B 3½ p.c.	129—134	53—58	...
108,075	,,	,,	—	33/3	Do. C	...	50—55	...
140,865	,,	,,	—	33/3	New Ordinary	...	50—55	...
352,000	,,	,,	6½	26/3	Wimbledon 5 p.c.	117—122	43—48	...
98,000	,,	,,	6½	32/6	Epsom 5 p.c.	121—126	50—55	...
88,416	,,	June 25	3	3%	3 p.c. Deb. Stk.	66—69	44—47	...

* Ex Div.